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Joseph Thomson
with the regards of
his friend

Wm. Parrish

W. H. Smith
F. R. S.
London
1850

FIRST REPORT

OF THE

COMMITTEE ON PUBLIC HYGIENE

OF THE

AMERICAN MEDICAL ASSOCIATION.

READ AT THE ANNUAL MEETING, HELD IN BOSTON, MAY, 1849.

WITH AN APPENDIX,

CONTAINING

SKETCHES OF THE SANITARY CONDITION

OF THE

CITIES OF CONCORD, PORTLAND, NEW YORK, PHILADELPHIA,
BOSTON, LOWELL, BALTIMORE, CHARLESTON, NEW
ORLEANS, LOUISVILLE, AND CINCINNATI.

Extracted from the Transactions of the American Medical Association, Vol. II.



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1849.

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H.

FIRST REPORT OF THE COMMITTEE ON PUBLIC HYGIENE OF THE AMERICAN MEDICAL ASSOCIATION.

THE Committee on Public Hygiene, would respectfully report:—

That immediately upon their organization, its members determined to devote themselves to specific hygienic inquiries, connected with their various residences, in order that they might be embodied in one collection, and thus furnish authentic data for future research on the highly important subject about to occupy their attention. In order to obtain greater definiteness, the chairman of the committee was directed to indicate to each member such subjects as it was thought most advisable to elucidate at this time, and likewise, to prepare a series of questions for distribution. This course became absolutely necessary, from the peculiarity of the information sought by the committee, which differed materially from that required by any other committee of the Association. To them, the vast field of medical literature was open, and it became their duty to gather valuable materials from this abundant harvest. The facts required by the Committee on Hygiene, on the contrary, were as yet, for the most part, unrecorded; books were silent on the subject; and the data which they sought to possess themselves of, were to flow from careful personal observations. How far the committee has succeeded in answering the ends for which it was created, and in placing on record these new contributions to science, it leaves for the Association to determine.

The principal inquiries of the committee have been directed to the effect produced on the inhabitants by residence in large towns, the results of which are to be found embodied in the several accompanying reports of its members. In all towns, however, whether large or small, which fell under the observation of the members of the committee, certain causes were invariably found to be in operation, to a greater or less extent, tending to the destruction of human life, and producing a greater mortality than in the adjacent country dis-

trict. Among these, deficient drainage, street cleaning, supply of water, and ventilation; together with improperly constructed houses, and the various kinds of nuisances incident to populous places, occupy prominent positions.

DRAINAGE.

One of the most important duties devolving upon the authorities of populous towns, is to devise means of effectually getting rid of the filth, which necessarily and rapidly accumulates, in and about the dwellings of its inhabitants; and for this purpose sewers unquestionably present the most efficient means at their disposal. The committee would here remark, that nothing is more detrimental to public health than the error, not unfrequently entertained by municipal authorities, that, where the surface drainage is good, it supersedes the necessity for under-ground drainage. The main purpose of surface drainage, is *to remove moisture, and not refuse animal and vegetable matter*, for which purpose scavenging and sewers are required. Sewers bear an intimate relation to the streets of a city under which they are usually built, and receive from the houses along their sides, by branch drains, not only the water that collects within them, and would otherwise become stagnant, but likewise those unhealthy emanations, and refuse materials, which, if not thus disposed of, would inevitably become sources of disease. They are subterranean canals, traversed by water, holding various unhealthy substances in solution, and possess an atmosphere peculiar to themselves: usually highly charged with ammoniacal and sulphuretted hydrogen gases. When properly constructed, they are among the most efficient agents within our reach for promoting health, but when improperly built or neglected, they are in the highest degree insalubrious. It is not alone necessary, therefore, that subterranean passages should be built, to carry off the refuse matter of a populous place, in order to insure its healthiness, but that they should be constructed in such a manner, as to perform their duty efficiently at first, and afterwards be constantly kept under the watchful vigilance of proper officers.

To answer this end, a system of sewerage must be adopted, which will collect the water that falls in the form of rain, and that derived from springs, from the entire area of the town, to be drained; for, it is by means of the flow of water, that the sewers are enabled to carry off the decomposing materials, which find their way into them. It need hardly be said that educated engineers are the only

persons competent to direct the execution of these important works. If uniformity be observed in the inclinations given to the entire drained district, but a very slight current is required to prevent the accumulation of deposits within the sewers; more especially if, as is generally the case in sewers, many small currents unite to form a larger one; because the united currents obtain a greater impetuosity over the same inclination, and sweep away the deposits with greater certainty than where they flow through separate channels. The deposits will be much more efficiently removed if the flow of water be over an inverted arch, than a flat bottom. It is highly important to prevent the formation of a deposit in the bottom of a sewer; when this does occur, it very soon becomes hardened to such a degree as to exclude the hope of its removal without extraordinary means. The dam thus made aids in the collection of fresh accumulations of those matters, which seek the most depending part of the current until not only the sewer in which the stoppage occurs, but those leading into it, are loaded with offensive accumulations, or entirely choked up. This difficulty is much more likely to occur in a flat-bottomed sewer, where the force of the current is diffused, than in one with an inverted arch, where its power is concentrated. Private drains from houses are often constructed of brick with little mortar at their bottom, in order to allow the water of the soil around them to penetrate their interior. In drains of this sort, the water is as likely to flow out as in; and, consequently, however well they may be built in other respects, it is impossible to maintain a current through them. The solid matters soon accumulate, and in a short time they become choked up. The committee are desirous of calling the attention of the Association to the necessity of maintaining currents of water within sewers, because they are of the impression that the entire filth of a town, under an extended system of sewerage, is dependent upon an adequate supply of water for its removal; and that, whenever this supply is deficient, accumulations must necessarily occur within the sewers.

Upon no subject within their jurisdiction have the municipal authorities of our populous places differed more widely from each other than in their plans of drainage; as well in the character of the works constructed by them as in their extent. The aggregate sewerage in Boston is about twenty-five miles; in Philadelphia, about eleven and three-fourths miles; while in Baltimore, it is *but little more than one mile*. New Orleans, which is remarkably situated, fifteen feet below the Mississippi river, is entirely de-

pendent upon surface drainage, as well as Louisville, Cincinnati, and indeed most of the towns of the United States. The bills of mortality of these different places, have not heretofore been kept in such a manner as to enable comparisons to be made between sewered districts and those which are without them. Could such results be obtained, the committee are well assured that they would present such facts, in relation to the high mortality of non-sewered districts, as would startle the legislators of our cities from their slumbers, and induce the rapid extension of these works to every portion of their respective towns. It is to be hoped that the day is not far distant, when a town without sewerage will be unknown in the United States.

STREET CLEANSING.

It is of the first importance to a city, that its streets should be laid out in such a manner, and paved with such materials, as to facilitate the discharge of its surface water; and this becomes the more imperious, where surface drainage is the only one in use. It is well known, that more malarial disease prevails in the suburbs of a town than in the town itself, or the adjacent country. This is doubtless due in a great measure to the innumerable pools of water, which a defectively drained surface allows to accumulate. The pavement for streets in almost general use in the United States, is laid with round paving stones, usually found in abundance in their immediate vicinity. Although this pavement is greatly inferior to cubical blocks of granite, yet, under the improved system of laying the stones now in use, it furnishes an excellent substitute for them.

The necessity for the removal of the refuse which is constantly accumulating in streets is so obvious, and so generally admitted, that no argument appears to be necessary to establish its claim to public favour. But while the authorities of every town in the United States, however inconsiderable its size, profess to rank this among their most important duties; but few places can boast of a thorough and efficient system of scavenging. The facts developed by the special reports of the members of the committee, show that, in our largest cities, the principal streets are not cleaned oftener than twice each week, and frequently but once. The smaller streets, although frequently inhabited by a denser population, are seldom visited by the street cleaners oftener than once or twice a month; and the courts are seldom or never cleaned, except when reported as nui-

sances. The mode of cleansing is likewise exceedingly superficial, and consists in removing the loose particles upon the surface. For the want of proper economy in the disposition of the street manure, this defective system is kept up at a considerable expense; and all arguments in favour of the introduction of a more efficient one, are met by the disinclination to increase this already heavy tax. Now, in those cities in Europe, where great attention is paid to cleaning the streets, experience has demonstrated that the more effectual its scavenging, the less is the city charged with its expense. Edinburgh, whose streets, including the narrow alleys and courts, are thoroughly swept daily, is made to bear but a trifling portion of the expense.

In most towns, laws are enacted to prevent the inhabitants from depositing the refuse from their houses in the streets; but where no other means is offered to them to get rid of the offal, it must eventually find its way into them. This offal consists of decaying vegetable and animal matter, which, under the influence of exposure to the sun, is constantly sending forth, to unite with air breathed by the inhabitants, the most deleterious gases, which are not only offensive to the smell, but prejudicial to health. Of all the causes of disease in cities, there is none more extensive in its operations, or more fatal in its results, than the poisonous emanations arising from the decomposing refuse of articles used as food, and employed in the arts, which collect in large quantities, not only in the streets, but within the very habitations of the inhabitants of populous places.

Here are sources of disease clearly indicated, which are in operation in all of our towns, affecting the health and physical condition of their entire populations, but wasting their greatest fury upon the labouring classes, who are doomed to make their abode in the most unhealthy quarters. Much has been said in favour of disinfectants, and great reliance is placed on them in the prevention of epidemics, but there is no disinfectant for filth except its removal. So long as badly drained and filthy quarters are permitted to exist in a city, so long will it be scourged by fevers, and liable to the invasions of epidemics. The fuel is always ready gathered, and it requires but the application of the torch to set the fabric into a blaze. Medical men who are conversant with a city, can, with unerring certainty, point out the localities of fever, by their uncleanliness; and it is a fact, established by the history of every epidemic, including the late visitation of the cholera, that it usually makes its appear-

ance, and commits its greatest ravages, in those uncleanly quarters, which are notoriously the permanent abodes of fever. In order to prevent this decomposition, the streets should be swept daily, including the narrow alleys and courts, which, indeed, demand greater attention than the more open thoroughfares; in addition to which, every facility should be offered to the inhabitants to get rid of the collections of the kitchen. Where none of these measures are taken, and where, in addition to the close, offensive air generated by the street collections, it is still further tainted by pig pens, overrunning privies, and stagnant water, it is scarcely a matter of surprise, that disease should be ever present, producing the degree of mortality revealed by our reports of interments.

WATER.

Pure water, like pure air, is so essential a requisite, that its presence is absolutely necessary to preserve human life. Indeed, its influence over the human organization is even greater than that of the atmosphere; for it has been abundantly proved, by too many examples, in our large cities, that life is enabled to maintain itself, while surrounded by a noxious and deleterious atmosphere; but it has yet to be shown that the same poisonous properties can be infused into water without immediately inducing serious disease.

But it is not only necessary that its quality should be good, but that its supply should be abundant in cities; where it is required for numberless purposes, other than an aliment; which could not be dispensed with, without great detriment to the comfort and morality of their inhabitants; among which may be enumerated domestic purposes, baths, washing streets, cleaning sewers, manufactories, and extinguishing fires.

Waiving the subject of an abundant supply of water for domestic purposes, as a question too self-evident to be discussed, the committee would call attention to the remarks already advanced in relation to sewers, and again urge the necessity for active currents of water through them, in order to avoid deposits. It must be constantly kept in mind that an absolute prerequisite for effectual drainage, both for the surface and sewers, is a copious supply of water, without which the best arranged structures would fail to effect this object.

Whenever the quantity of water furnished to a town is deficient, the heaviest burden of the evil must, from necessity, fall upon the

poor. If there are any parts of a town which possess an unenviable reputation on account of bad drainage, consequent accumulations of filth, and excessive disease, they are invariably inhabited by the poor. The result of much observation on this subject has convinced the committee, that many of the evils, and much of the disease incident to poverty, may be relieved by copious and never-failing supplies of pure water. It would be a great mistake to imagine that the poor are incapable of estimating the advantages of pure water, or would not avail themselves of it. The experience of New York and Philadelphia, which are more abundantly supplied with water than any of the other cities in the United States, has established this point beyond controversy. The introduction of an abundant supply of water is so intimately connected with the health of a city, that the municipal authorities should rank this among the most important of their public duties. In connection with this matter, the committee are deeply impressed with the importance of confining the execution and management of such great works, as a supply of water, gas, and drainage, to the city authorities. The public welfare is too deeply interested in their faithful performance, safely to permit them to pass into the hands of incorporated companies; who, however high-minded they may be, look to them as sources of revenue, and not as objects of public good.

BUILDING AND VENTILATION.

The lungs of each individual are constantly penetrated by an atmosphere which momentarily exercises a healthy or unhealthy influence over the entire organization. The object of respiration, which is constant, is to introduce into the lungs, with a certain degree of force, a large quantity of air, which loses a portion of its oxygen, and receives in return a certain amount of carbonic acid gas. Now, when a large number of persons occupy an apartment the air of which undergoes but little change, the simple act of respiration converts the healthy into an unhealthy atmosphere. But it is not the change induced by respiration alone which vitiates the atmosphere. The body is always giving off other emanations, in the form of insensible perspiration and animal heat, whose effect on the air is strikingly prejudicial.

The insalubrity of the atmosphere of populous places, is dependent, however, upon much more powerful causes of vitiation, than those induced by respiration alone. Organic substances in a state of

putrefaction, offensive odours from pig-sties, and uncovered inlets to sewers, humidity, and such an arrangement of the buildings as to prevent a change of air, and effectually cut off ventilation, are here the powerful promoters of its impurity. Those parts of a town, therefore, which are built up with innumerable courts and tortuous or narrow alleys, are permanent abodes of infection, and are constantly giving forth those noxious emanations, which not only poison the atmosphere in their immediate vicinity, but extend to a considerable distance into the better built and ventilated parts of the town. These emanations are the cause of much of the disease which is incident to poverty. Their immediate action is to induce febrile and asthenic affections; hence consumption, scrofula, and rheumatic and gastric affections, are their constant attendants.

If evils of such great magnitude are the necessary consequence of inattention to ventilation and building, it becomes one of the highest duties of city authorities to regulate the erection of houses with an eye to their prevention. Streets should be of a certain width, proportioned to the height of the houses, and always laid out at right angles, or at least so as to secure a free circulation of air through them. If the streets are narrow and the houses high, they will be damp, and, if too wide, liable to inconvenience from the heat of the sun. The houses upon their sides should be regulated so as to prevent an over crowding of population, which is very likely to occur where the proximity to business renders the ground valuable.

The ventilation of public schools is a subject of much importance, which is usually neglected, and which earnestly addresses itself to those having charge of them. For various facts connected with this subject, the committee would refer to special reports of its members.

The necessity for public squares, tastefully ornamented and planted with trees, cannot be too strongly urged upon public attention, as one of the most powerful correctives to a vitiated air within the reach of the inhabitants of a populous place.

NUISANCES.

Those nuisances which owe their origin to the subjects before enumerated, and which may be summed up in defective draining and cleaning, are unquestionably the most extensive in their operation; but there are others more confined in their character, and less palpable in their effects, which yet require a brief consideration. These consist in the various kinds of manufactories, butcheries, and public

works, incident to towns, and almost always found in their midst. These may, by the discharge of noxious and acrid gases, be directly prejudicial to health ; or, from the evolution of large quantities of black smoke and unpleasant odours discommode, without exercising a direct influence in the production of disease ; hence, it has been customary to rank them in different classes, dependent upon their deleterious action.

Those establishments which are found to be most unhealthy, are the manufactories of the different kinds of powerful acids, as nitric, sulphuric, and hydrochloric. But a slight remove from these, are the manufactories of brass, chemicals, compounds of lead, and copper smelting works. All of these operate by loading the air with emanations eminently prejudicial to health, and not unfrequently to vegetation. In order to render them innoxious, chimneys of great height have often been erected, but without materially lessening their deleterious effects on the inhabitants surrounding them.

Next to these, stand gas works, butcheries, soap and candle factories, dyeing establishments, manufactories of the sulphates of zinc and iron, phosphorus, friction matches, and an innumerable number of others ; some of which are injurious on account of the unhealthy gases they emit, while others are rather sources of discomfort than of immediate disease. Great diversity of opinion exists concerning the unhealthiness of gas works. It is admitted that, in the manufacture of gas, as well as in the refuse material left after its production, large quantities of sulphuretted hydrogen, and ammoniacal gases, are given off to the surrounding atmosphere, which are known to be eminent sources of disease. The theory has of late been agitated, and very ably advocated by Professor Gardner, of Hampden-Sydney College, that sulphuretted hydrogen gas is the cause of autumnal fever. It is no argument in favour of the healthiness of a manufactory, that the workmen enjoy an immunity from its evil consequences ; because the fact is well established, that the human body can become accustomed to the effects of the most deleterious agencies, without apparent injury. The question is not whether the workmen immediately engaged are affected or not, but what are the causes of the high rates of mortality, which the large cities of the United States, in common with those of the rest of the world, exhibit. If the neighbourhood of manufactories are found to be more unhealthy than other places, it becomes the duty of every municipal body to interdict them in populous parts of the town, and this furnishes a very strong argument in favour of the corporate authority

of a city immediately furnishing to its inhabitants a supply of gas, without the intervention of an incorporated company. The committee would earnestly urge the establishment of one general butchery, at a convenient distance from each town, as one of the most important sanitary measures it can adopt.

DISINFECTANTS.

Great reliance is placed by corporate authorities on the preventive power of certain substances to arrest the spread of diseases, which are *now* known to be more or less intimately connected with the presence of nuisances; hence, on the appearance of an epidemic, it is customary for them to recommend the free use of a class of agents termed *disinfectants*, as chloride of lime, fumes of nitrous acid, &c. The facts in our possession, in relation to the value of disinfectants, are exceedingly vague and unsatisfactory, and by no means warrant the reliance placed in them, over evils of such vast extent as the impurities of a populous place. The great source of infection is *putrefaction*; by preventing putrefaction, we are enabled to arrest infection; but no agent has yet been discovered sufficiently general in its operations to reach the putrefactive process eliminated from the numberless sources ever present in towns. Air, heat, and water, which are necessary to produce putrefaction, are nevertheless, in the laboratory of nature, the principal agents she employs as disinfectants. Chemical agents, on which most reliance is placed, are confined in their efficacy to a very small extent of surface, and are very uncertain in their operations. It is obvious that, in order to reach an evil, we must ascertain something of its nature. Now, in what consists the infection of typhus or yellow fever, or cholera? Is it a gas? If so, why does it confine itself to a particular locality of very limited extent, frequently being intercepted by a very narrow street? and if not a gaseous product, which is the generally received opinion, where is the evidence of its assuming any other form? But although disinfectants are not capable of arresting epidemic diseases, they are not altogether useless; confined within proper limits, their use is highly advantageous, not only in destroying fetid odours, but in some degree in restoring purity to the air. Their operation is necessarily confined, and their advantages consequently limited. The wards of hospitals, dwelling-houses, and privies, may derive advantage from their use, but surely no one would be visionary enough to think of disinfecting the unwholesome atmo-

sphere of a populous city, by means of any chemical agency, however extensive, within his reach.

Among the various substances of this class which have of late obtained considerable celebrity, the solutions of chloride of zinc and nitrate of lead occupy a prominent position. A solution of the nitrate of lead, known as *Ledoyen's disinfecting fluid*, to be found in most of our towns, has probably a higher reputation than any other in use at this moment, although other combinations of nitric acid, as those with zinc and wood fibre, are advocated as possessing peculiar merits. The principal advantage of Ledoyen's fluid over others, is its power of removing an offensive smell, without substituting another in its stead. The committee, however, have not learned of any case in which the application of any agent of this class has done more than to arrest putrefaction *temporarily*. So long as the cause exists, so long will disease be generated; and while the committee do not hesitate to recommend the use of disinfectants, they would at the same time caution the public authorities and inhabitants of populous towns against placing reliance on them to the exclusion of the strictest measures for removing the sources of disease, which are found to reside in uncleanness, and impurity of the atmosphere. If they usurp the place of these sanitary measures, which can alone render a town salubrious, so far from being advantageous their use will be eminently injurious.

CONCLUDING REMARKS.

With these general observations your committee will introduce the special reports from individual members, embracing an account of the sanitary condition of the cities of Portland, Concord, Boston, Lowell, New York, Philadelphia, Baltimore, Charleston, New Orleans, and Louisville, so far as it may be developed by answers to the questions propounded in the circular issued by them.

They are aware, however, that the investigation into this interesting and almost unexplored region of medical inquiry, has but just commenced; and that their labours have accomplished little more than to open the way for its farther, and, as they hope, more successful prosecution. The subject they conceive to be one eminently congenial with the purposes of the Association, inasmuch as it has for its object the preservation of human life, and the removal of those causes of disease and death which it is in the power of legislation to eradicate, and to which the public mind must be directed by

those medical bodies, whose philanthropic and honourable duty it is to preside like sentinels over the avenues by which human misery is admitted, and warn those whose scope of vision is less extended, of the approach of the evil, before it is too late to avoid it.

That the efforts of physicians, when directed to such objects, are not always abortive, is shown from the events which are now occurring around us. During the deliberations of this Association, the Commonwealth, in whose capital we are assembled, has manifested a regard for her citizens, and for the voice of her medical men, which is worthy of the imitation of her sister States, by the passage of a law for a sanitary survey of the State; and has thus obtained the high distinction of being the first State in the Union, to direct her legislation to a source so intimately connected with the welfare and happiness of mankind.

JAMES WYNNE,
ISAAC PARRISH,
L. P. YANDELL,
J. P. HARRISON,
E. H. BARTON,
P. C. GAILLARD,
JOSIAH CURTIS,
JOHN H. GRISCOM,
ALBERT SMITH,
CHARLES P. GAGE,
E. D. FENNER,
JOHN M. THOMAS.

H.—I.

American Medical Association, Committee on Public Hygiene.

AT the Annual Convention of the American Medical Association, held in Baltimore, in May, 1848, the following gentlemen were appointed a Committee on Public Hygiene:—

Drs. JAMES WYNNE, *Baltimore*,
CHARLES P. GAGE, *Concord, N. H.*,
JOHN M. THOMAS, *Washington, D. C.*
ISAAC PARRISH, *Philadelphia*,
P. C. GAILLARD, *Charleston, S. C.*,
L. P. YANDELL, *Louisville, Ky.*,
J. P. HARRISON, *Cincinnati, Ohio*,
ALBERT SMITH, *Peterborough, N. H.*,
JOSIAH CURTIS, *Lowell, Mass.*,
EDWARD H. BARTON, *New Orleans*,
JOHN H. GRISCOM, *New York*,
E. D. FENNER, *New Orleans*.

It is the purpose of this committee to make a sanitary report, embracing the principal cities in the United States; and with a view of facilitating their inquiries, you will greatly oblige by furnishing the member of the committee who requests the information of you, with answers to the following questions:—

1. What is the population of the town, and its position in relation to the surrounding country; what the geological formation of the country, the nature of its surface and subsoil, and the means of, or impediments to drainage, more especially within the town limits?
2. What is the character of the town in reference to health? What is the condition of its most unhealthy and crowded parts, where disease is supposed to be most prevalent; and to what causes are such diseases mainly attributable?
3. What are the arrangements for drainage? Is there a public survey of levels? Are the streets and alleys paved and laid out with

a proper inclination for surface drainage; or are they defective in these particulars? Is the drainage effected by sewers or surface drainage, and is the mode adopted effective?

4. What is the mode and expense of cleansing the streets? Are the courts and alleys occupied by the poor cleaned, and how often? Where is the refuse from the houses deposited; and where is the street manure kept, and how disposed of?

5. What is the condition of the more densely populated parts of the town in respect to ventilation? Are the streets wide or narrow? Are courts and alleys built up, and closed at the end, and what is the character of the houses of the poor? What number of families occupy one house; how many persons live in one room, and what provision for ventilation? How are the houses warmed in winter?

6. What is the system of public schools, and its influence on health? At what ages are children received into them? What is the size of room, the number of occupants, time allotted to instruction, means afforded for exercise in the open air, and length of summer vacation?

7. What hospitals and dispensaries? How are the public buildings ventilated, as churches, &c.; and what provision for public grounds or squares?

8. From what source is the town supplied with water? What are its qualities, and is it abundant?

9. Are the municipal regulations on the above subjects effective or not?

By order of the committee.

JAMES WYNNE, *Chairman.*

BALTIMORE, May, 1848.

H.—2.

Sanitary Report of Concord, N. H. By CHARLES P. GAGE, M. D.

1. Concord, the capital of New Hampshire, with a population of eight thousand, and an area of forty thousand acres, lies on both sides of the Merrimack River, in N. lat. $43^{\circ} 12' 29''$, and W. lon. $71^{\circ} 29'$, forty miles inland from Portsmouth, and seventy N. N. W. from Boston, Mass. By railroad, it communicates with the chief seaboard towns in New England, and, with a rich and extensive agricultural interior, abounding in mineral and manufacturing resources.

The country may be considered as divided into three parts: 1. The rich river alluvion, one mile in width, and extending from north to south eight miles, dividing the town into two nearly equal parts. 2. The diluvial deposit of granitic sand, forming level plains, wooded with low pines, and comprising nearly one-third of the area of the town. On this portion, there are but few inhabitants. 3. The oak land or hilly portion, rising into numerous swells of rich land, occupied by a temperate, industrious, and independent yeomanry.

Its geological formation is *granite*, covered with a diluvial detritus of granitic sand, in depth varying from ten to one hundred feet, through which a white, fine-grained granite shows itself, forming, in some localities, low ridges, in others, hills of considerable elevation. Granite Hill, one hundred feet in height and three miles in circumference, is a solid mass of as pure granite as can be found on the globe.

The soil on the river is a rich alluvium; on the plains it is a thin, gravelly loam, with a subsoil of sand. On the upland, the soil is a yellow loam, with a hard, gravelly subsoil.

2. The village extends a distance of two miles along the river, and is about one mile in width. Good natural facilities for drainage are afforded to nearly every part of the town, the highest point being one hundred and forty feet above the intervalle. On the southwest margin of the town is a wet hollow, fed by springs, which

may be kept dry by proper drains. There has been no public survey of levels; consequently, regard has not been had, in all instances, to proper inclination for surface drainage. The streets are not paved. There are no alleys. Drainage is effected partly by sewers, but mostly by surface drains, and is tolerably effective. The streets are very wide and straight, crossing each other at right angles, affording good ventilation.

3. The streets are cleansed at the expense of the persons living on them, and by the farmers in the vicinity. The refuse from the houses is generally deposited on the gardens, one being connected with almost every house.

There is, in a thickly settled part of the town, a slaughter-house, the stench from which, in summer, is so intolerable, as to compel the inhabitants in the neighborhood to keep their doors and windows closed for weeks together. It is now under indictment as a nuisance.

4. An abundant supply of good water is obtained from wells and springs in the town, and its immediate vicinity.

5. The houses are mostly of wood, two stories high, and designed for one family only. The houses are warmed by close stoves. The sleeping rooms are, as a general thing, too small. The public buildings, as well as private dwellings, are deficient in means of ventilation—doors and windows being the only arrangement for that purpose. The town is well provided with public squares.

6. Children are admitted into schools at four years of age. The sexes are never separated. In most districts, all are taught in the same room, by a single teacher. The rooms are about twenty-five feet by thirty feet, and nine feet high, with an average of thirty scholars in winter, and twenty-five in summer, in each. In the village, the school-rooms are larger, and more crowded. In one instance, a room $45 \times 56 \times 11$ feet, has seats for one hundred and eighty scholars, and sometimes they are all filled. In no instance is there any other mode of ventilation than the imperfect one of doors and windows. The scholars are taught in three different departments—reading and spelling in the first; reading, writing, arithmetic, and geography in the second; and all the higher English branches in the third.

During each of the secular days in the week, the school is taught three hours each forenoon, and three on each of the afternoons, except those of Wednesday and Saturday. The children have ample means for exercise in the open air. The summer vacation is from

two to three weeks. The system is as little injurious as any, where the children are admitted so young, and where so little attention is paid to ventilation.

7. The town may be considered one of the healthiest in New England. By reference to Table I., it will be seen that, for the last ten years, the proportion of deaths has ranged from 1 in 101, to 1 in 50 of the whole population, and that the average of age is 29.71 years. It will be seen, too, that more than one-third of all the deaths are of children under ten years of age. This may be accounted for, in part, perhaps, by the fact that many mothers are obliged to wean their children very early, sometimes within the month, on account of a sore mouth peculiar to nursing women.

The poor are well housed, and supplied with the actual necessities of life; through the charitable societies, they are in sickness well cared for, and supplied with many little conveniences and luxuries.

There is an asylum for the insane, and also an almshouse. There is no dispensary but the one connected with the State prison.

The effect of confinement and discipline in the N. H. State prison is salutary, partly from the compulsory abandonment of irregular and intemperate habits, and partly from the forced observance of strict hygienic rules. The inmates suffer from all prevailing diseases equally with the people in town, but all affections are more under the control of the physician, and treated with better success, on account of the habits of the patient, and his perfect submission. Masturbation is the prisoner's besetting sin, and often produces death.

Each prisoner eats and sleeps in a cell by himself. Each cell is constructed for one man only, with a grate in the upper part of the door to admit the fresh air, and an opening in the wall opposite, communicating with a flue leading to the outer air. This mode of ventilation is very defective, especially in summer, when the prisoners are kept in the cells from sunset until sunrise. It is regarded by them as their greatest punishment. The prisoners work in the large yard connected with the prison, or in large, well ventilated shops, from fifteen to thirty in each room.

The fact that the rate of mortality for thirty-six years, is only 1 to 79.21 of the whole number, shows that the prisoner enjoys an advantage over his more fortunate brethren without.

“What is the influence likely to be produced by the extensive introduction of tea and coffee into the diet of persons under the age of puberty?”

Injurious; causing undue excitement of the vascular and nervous systems, and functional derangement of the digestive organs, particularly the liver. Tea acts more directly on the nervous system than coffee, partly, because almost all the tea in the market is poisoned by deleterious agents used in its preparation. Coffee has an almost immediate injurious effect on the liver; and, as that organ in the child is relatively larger than in the adult, it may be held that, the younger the child, the more pernicious the use of the article. Both tea and coffee tend to enervate and derange the whole system, and to produce an effeminate race.

“What is the influence of the substitution of the luxuries, tea and coffee, as a food, upon the health of the labouring classes?”

Injurious. They act as slow poisons. The effect is more perceptible, and more easily traced to the cause, than in the fashionable devotee, for its consequences are not modified by other deleterious agents and practices.

TABLE II. is a meteorological table kept by Abial Chandler, Esq., of Concord, and has been prepared with great care.

TABLE I.

Showing the number of deaths, ages, &c., in the town of Concord, N. H., for nine successive years, as drawn from records kept by Rev. Nathaniel Bouton, pastor of the First Church, in said town. Mr. Bouton has kept a record of deaths annually, in Concord, for the last 24 years; from which a table may be constructed showing the number who have deceased, time of death, age, proportion to the population, consumptives, inebriates, and those who have died by casualties.

Years.	Under 1 year.	Between 1 and 10.	10 and 20.	20 and 30.	30 and 40.	40 and 50.	50 and 60.	60 and 70.	70 and 80.	80 and 90.	90 and 100.	Over 100.	Total.	Estimated population.	Proportion to population.	Average of all.	Consumptives.
1839	13	18	2	7	2	5	1	1	8	3	3	1	65	4750	67.7	29.8	8
1840	11	11	3	9	7	5	8	6	9	4	0	0	73	4900	67.0	34.7	15
1841	12	18	3	6	7	4	6	4	6	5	1	0	72	5000	69.4	30.	13
1842	2	10	5	7	5	7	5	1	7	2	0	0	51	5200	101.0	35.6	13
1843	15	22	6	7	6	5	8	8	11	2	0	0	89	5500	61.	27.	18
1844	24	26	9	10	10	2	8	9	10	2	2	0	113	5700	50.	25.7	17
1845	20	15	3	16	13	7	4	4	8	6	2	0	98	6000	61.	30.1	18
1846	26	23	10	17	10	6	9	10	3	3	1	0	120	6800	56.6	23.5	20
1847	20	22	10	10	10	10	10	12	6	2	1	123	7500	61.	34.7	17	
1848	27	19	11	15	9	7	3	7	9	5	0	1	113	8000	70.9	26.	14
Total	171	184	62	104	79	58	62	60	83	38	11	3	917		66.56	29.71	153

TABLE II.

Meteorological Tables for Concord, N. H., for the years 1843, 1844, and 1845. Lat. 43° 12' 29". Long. 71° 29'.

1843.	Thermometer.				Barometer.				Pre-vailing wind.	Remarks.
	Maxi-mum.	Mini-mum.	Range.	Mean temp.	Maxi-mum.	Mini-mum.	Range.			
January	50	— 20	70	28.48	30.13	28.52	1.61	N. W.	The tables are made up from two daily observations, taken at about 15 minutes before sunrise, and at 2 o'clock P. M.	
February	40	— 13	53	18.20	30.05	28.90	1.15	N. W.		
March	45	3	42	25.80	30.13	29.00	.97	N. W.		
April	65	6	59	42.00	29.97	29.00	.97	N. E.		
May	80	34	46	53.30	30.10	29.30	.80	N. W.		
June	91	33	58	61.30	30.02	29.25	.77	N. W.		
July	90	42	48	65.20	30.11	29.40	.71	N. W.		
August	85	49	36	67.20	30.18	29.49	.69	N. W.		
Septem.	85	34	51	58.80	30.13	29.44	.69	N. W.		
October	65	26	39	44.50	29.93	29.20	.73	N. W.		
Novem.	48	11	37	33.40	30.16	29.22	.94	N. W.		
Decem.	43	1	42	28.4	30.20	29.06	1.14	N. W.		
Year	91	— 20	111	43.88	30.18	28.52	1.66	N. W.		
1844.										
January	40	— 15	55	15.2	30.01	28.68	1.33	N. W.	The barometer hangs in a room without a fire at any time of year. It is of the common cistern kind. Inside diameter of the cistern 1.50 inch, outside diameter of the tube .42 inch, inside diameter of the tube .24 inch. There have been no corrections applied to the observations of it.	
February	48	— 9	57	23.5	29.97	29.20	.77	N. W.		
March	56	10	46	33.4	30.13	29.12	1.01	N. W.		
April	72	7	65	47.8	30.46	29.43	1.03	E.		
May	77	31	46	55.9	30.03	29.18	.85	N. W.		
June	88	40	48	63.5	30.07	29.46	.61	N. W.		
July	84	40	44	65.8	29.92	29.36	.56	N. W.		
August	81	51	30	64.0	29.94	29.32	.62	N. W.		
Septem.	84	32	52	58.0	30.14	29.01	1.13	N. W.		
October	70	26	44	47.9	30.21	29.15	1.06	N. W.		
Novem.	52	12	40	37.1	29.90	29.04	.86	N. W.		
Decem.	48	— 5	53	28.4	30.20	28.75	1.45	N. W.		
Year	88	— 15	103	45.04	30.46	28.68	1.78	N. W.		
1845.										
January	46	0	46	24.1	30.10	29.02	1.18	N. W.		
February	48	— 8	56	25.0	30.20	28.58	1.62	N. W.		
March	61	0	61	34.4	30.03	29.02	1.01	N. W.		
April	76	22	54	44.1	30.03	29.12	.91	N. W.		
May	90	32	58	56.5	30.08	29.23	.85	N. W.		
June	90	42	48	64.7	29.85	29.36	.49	N. W.		
July	92	50	42	68.0	29.82	29.30	.52	N. W.		
August	91	46	45	67.6	30.01	29.33	.68	N. W.		
Septem.	80	31	49	55.4	30.01	29.09	.92	N. W.		
October	73	16	57	47.1	30.15	29.36	.79	N. W.		
Novem.	63	10	53	39.6	30.20	28.49	1.71	N. W.		
Decem.	38	— 8	46	20.4	30.13	28.95	1.18	N. W.		
Year	92	— 8	100	45.57	30.20	28.49	1.71	N. W.		

H.—3.

Replies to Circular Letter. By Dr. J. T. GILMAN, of Portland, Maine.

Query 1st.—1. Portland, with a population of about twenty thousand, is situated on a peninsula at the western extremity of Casco Bay, and composes an area of about twenty-two hundred acres. It has railroad and water communication with an extensive interior, rich in agricultural, mineral, and manufacturing resources, to which it furnishes the nearest seaboard market.

2. Its geological formation is *metamorphic*, consisting of talcose or mica slate, with occasional beds charged with minute crystals of hornblende and laminæ of iron pyrites.

3. The soil is a yellow loam, with a subsoil principally of gravel.

4. The land, on which the town is built, rising gradually from the water sides, furnishes natural facilities, almost unequalled, for drainage.

Query 2d.—1. The town is, and has always been, unusually healthy.

2. There are no crowded or unhealthy parts, where disease is particularly prevalent.

Query 3d.—1. There are no arrangements for drainage by public authority.

2. There is a public survey of levels, or *grade* of the streets, as we term it, which is sufficient, in all cases, to carry off the surface water freely, in most cases *briskly*.

3. The streets are not generally paved: some of those most exposed to injury, from the rapid motion of surface water, in heavy showers, are paved. Alleys, we have none. Inclination for surface drainage answered in No. 2.

4. The cellars are generally drained beneath the surface by private drains or sewers, which carry off, also, the water from sinks; the private drains communicating with some *main trunk*, which is to be found in almost every street, built at the expense of indi-

viduals or neighborhoods, and which empties into the dock. This mode is effective so far as adopted.

Query 4th.—1. There is no municipal provision for cleansing the streets; the natural facilities for surface drainage, before referred to, cause them to be washed by every shower.

2. There are but very few courts occupied by the poor, and those are spacious and clean. Alleys, there are none.

3. The refuse from the houses, not carried off by sewers, is taken away by the "city cart," which passes through all the streets, several times a week, for that purpose.

4. The street manure, where retained, is gathered up from time to time by inmates of the almshouse, and deposited upon the grounds of the farm connected with that establishment.

Query 5th.—1. The most densely populated parts of the town have the advantage of free ventilation.

2. The streets are generally wide.

3. Courts and alleys answered in query 4th, No. 2. The houses of the native poor are, for the most part, comfortable, healthfully situated, and not over-crowded; those of the *Irish*, are as well situated, but almost invariably over-crowded, filthy, and very imperfectly ventilated.

4. The houses are warmed by wood or coal close-stoves.

Query 6th.—1. Children of both sexes are taught in our primary schools; they are admitted at four years of age, and remain until they can read and spell fluently, and cypher in *long-division* readily, when they are admitted into the grammar schools. Here the sexes are separated, the girls and boys attending schools held in different buildings. The influence of our system upon the health of the pupils is not prejudicial, so far as I know.

2. The rooms vary in size, according to location, and the probable number of pupils to be accommodated. Those in our principal school-houses are from twelve to sixteen feet high, with corresponding proportions, and carefully ventilated. The number of pupils varies from fifty to one hundred and fifty, in each room; each pupil, however, having sufficient space both for *moving* and *BREATHING*. Instruction is given six hours a day, except Wednesday and Saturday, to which three hours each are allotted. An intermission of twenty minutes is allowed, forenoon and afternoon, for exercise in the open air. There are two summer vacations, of one week and two weeks.

Query 7th.—1. There is a marine hospital—no dispensary but the one connected with the almshouse.

2. The public edifices, of *recent construction*, have been built with due regard to ventilation. The high grounds, at the eastern and western extremities of the town, are appropriated for public promenades, and afford a highly invigorating air, and a prospect, both of land and water, unsurpassed in richness, variety, and extent.

Query 8th.—Good water, and an abundant supply, is furnished by wells and springs. Rain water, subjected to the process of filtration, is usual, and preferred in many families.

Query 9th.—The municipal regulations in the above subjects are generally effective.

H.—4.

COMMITTEE ON PUBLIC HYGIENE.

Hygiene of New York City. Reported by JOHN H. GRISCOM, M.D.

Query 1. The population of the city of New York may now be estimated at 400,000.

Its position in relation to the surrounding country is highly salubrious, being on an island, of triangular shape, all sides of which are washed by broad and deep rivers, with rapid currents of salt water, which run in both directions as the tide rises and falls, and are never at rest. The rise and fall of the water average about six feet.

The base upon which the island rests is supposed to be a basin of rock, pushed up at some points of its edge, and forming a hollow in the centre, which is believed by some to contribute to a certain degree of dampness of subsoil; but in the more thickly settled portions of the city there have not thus far been discovered any serious impediments to sewerage, as far as it has been tried. The basin alluded to, if it does exist, is too far beneath the surface to present any obstruction to drainage by sewers.

2. With reference to health, the character of the city of New York is by no means what it might be, if its natural facilities for maintaining cleanliness, and enforcing other sanitary measures, were properly regarded and diligently embraced.

Its ratio of mortality is believed to be above the average of large cities, and when its great natural advantages are taken into consideration, and a comparison instituted between it and less favoured places, we must necessarily look to its sanitary regulations for the cause of this.

A large deduction is, however, to be made from the bills of mortality on account of the numbers of foreigners who die here, of diseases contracted in other places, and who, on arrival, had health permitted, would not have remained in the city.

Its most populous parts are exceedingly crowded, and in very many instances, no regard whatever is paid to the numbers inhabiting any particular house or section.

There is no law to regulate the number of inhabitants to any given space; and such a law as is now in force respecting the number of passengers in ships, would confer very great benefits upon the poorer classes of this city. Diseases of asthenic character are very prevalent among them; arising, doubtless, from the impurities of the air they breathe, in their low, rotten, and crowded tenements, and the abundant filth with which they are surrounded and encased.

3. The arrangements for drainage are good and improving. Surveys of levels are made, and new sewers rapidly projected. In most parts there is good inclination for drainage, though in some places the surface is quite level, and stagnant water is by no means uncommon. The streets and alleys are almost universally paved, in the most thickly inhabited parts of the city.

4. The mode of cleansing the streets has varied in past years. Formerly, an ordinance required each house occupant to sweep up the dirt in front of his own residence, two or three times a week, which was then to be removed by public carts. On account of the number of distinct families occupying single houses (all of whom could not be made responsible for the work), and other causes, rendering the enforcement of that law difficult and almost impossible, the mode was changed, and a municipal department created for the purpose, and the streets were swept by labourers employed by the corporation. This continued several years. Subsequently, the sweeping of the streets was let out on contract, first to one contractor, afterwards to several, the city being divided into districts for the purpose.

All plans have failed to insure thorough cleanliness. Street-sweeping machines have not been permitted, it is believed, for the principal reason, that they cannot exercise any political influence—they cannot vote—the street sweepers forming a strong and important corps of voters, who cast their suffrages as they are required by the party in power.

The expense of cleaning streets, including the removal of coal ashes, garbage, &c. &c., amounted, in 1848, to \$145,844 95; the receipts for sale of manure, &c., being \$18,592 32, leaving a net cost to the city of \$127,252 63.

5. In the more densely populated parts, the ventilation is exceedingly imperfect; the internal ventilation is about as bad as it can be.

Most of the streets cannot be termed narrow, when compared with the old cities of Europe; most of the narrowest are mere alleys, and many of these are closed at the end. There are, however, fewer of these closed alleys or courts than in the city of Philadelphia. The dwellings of the people inhabiting these parts are of the worst possible description; old, dilapidated, and filthy, and crowded with people to an extent scarcely to be believed. As many as twelve to fifteen have been known to occupy one room; sixty may be the entire number in one house. One exception, however, stands out prominently above all others, a curiosity in the way of human habitations, known as the old Brewery, at the Five Points, which has often been known to hold 300 dwellers.

The average number of people in each room, in the poorest parts of the city, is probably six. The ventilation, as before remarked, is as bad as it possibly can be, the atmosphere being rendered worse in winter, by the methods adopted for warming; small stoves for burning anthracite coal being universally used. Other parts of the city, which may be characterized as densely inhabited, are occupied by mechanics and artizans, who, with their families, occupy an entire floor; a suit of two or three rooms taking the place of the single room already referred to; twenty to twenty-five persons thus living in one house.

6. There are, in all, one hundred and seven public schools in New York; eighty-three of them under the care of a charitable society established in 1805; and twenty-four under the control of the public authorities. Children are received at all ages; for the youngest, there are sixty-five of these schools, denominated primary schools.

It is difficult to say, precisely, what effect these schools exercise on the health of the children. Whatever bad effects are produced, must be attributed to the great numbers in them, and to the absence of a scientific method of ventilation. The rooms are usually quite filled, *often over-crowded*; recitation-rooms, of smaller dimensions than the main room, are often found in the buildings, to which classes of the more advanced pupils frequently retire, and thus, perhaps, are in a measure relieved from the evils of constantly breathing the air of a large and crowded room, though this relief cannot amount to much, all the rooms being under one roof, and between the same walls.

The mode of ventilation, *generally*, consists in nothing beyond flues, which open into the rooms, and into which, in winter, stove-pipes are introduced. There are some exceptions to this deficiency,

however, some of the elegant buildings recently erected being ventilated upon the plan introduced by Joseph Curtis, while the method of warming by hot-air furnaces, causing an influx of warm fresh air, in winter, though imperfectly carried out, is getting more in vogue.

The time allotted to instruction is from nine o'clock till twelve, with a short intermission during that period, in the morning, and from two to five in the afternoon, in summer; in winter, from nine to three, with appropriate short intervals. On Saturday of each week, there is a release from school duty, and a vacation of from three to five weeks in summer.

7. There are three dispensaries affording medical aid and medicine gratuitously to 50,000 patients annually; which, with the City Hospital, which has about 300 beds; the Bellevue Hospital, with 800 beds; a Lying-in-Asylum, capable of accommodating about fifty patients; with an Infirmary for diseases of the eye and ear, constitute the medical charities of the city.

There is no general system adopted for ventilating public buildings. Most of the older churches have no arrangement whatever for this object, and some of the more recently built edifices have nothing more than an opening in the ceiling.

Some of the open squares are remarkable for their beauty, and the taste displayed in their arrangement. Four of them have fountains of very large size, which throw the water to a great height. These squares are by no means so numerous as they should be in so large a city. In the newly built sections, however, ample provision has been made for them.

8. The city is supplied with water from the Croton River, and is brought a distance of forty miles by means of an aqueduct, which empties into a *receiving reservoir*, covering thirty-five acres of ground; it is thence conveyed to a *distributing reservoir*, into which it flows without the aid of any hydraulic machinery. The elevation of the latter reservoir enables the water to be received in any part of the city, eighty feet from the ground. It is abundant, and of very excellent quality.

9. The municipal regulations have hitherto been quite inefficient; they have, however, been improving for the last few years, and the new charter which the city has recently obtained, will, it is generally thought, add much to their efficiency.

H.—5.

Report on the Sanitary Condition of Philadelphia. By ISAAC PARRISH, M. D.

“WHAT is the population of the town, and its position in relation to the surrounding country; what the geological formation of the country, the nature of its surface and subsoil, and the means of or impediments to drainage, more especially within the town limits?”

Topography, &c.—The city of Philadelphia, in lat. $39^{\circ} 57'$ north, and long. $1^{\circ} 54'$ east of Washington, is situated on the western shore of the river Delaware, on moderately elevated ground, extending westward, about two miles to the river Schuylkill, which unites with the Delaware, three miles to the south. The Delaware is a mile wide opposite the city, and admits ships of heavy burthen to come to its wharves, which are strung along an extent of nearly five miles. The water of the river continues fresh for about thirty miles below the city, or nearly one-third the entire distance to the Atlantic Ocean, by the natural course of the river and bay. In a direct line eastward, across the State of New Jersey, the distance to the sea is about forty-eight miles.

The river Schuylkill, opposite the western side of the city, is about 200 yards wide, where it admits sea vessels of moderate draught.

The portion of the isthmus formed between the Delaware and Schuylkill on which Philadelphia stands, is of the modern tertiary formation, consisting below of sand and gravel, overlaid with a thick bed of clay, the whole resting on a primitive basis, which shows itself on the surface, in some of the north-western districts. Fresh water is easily obtained, by digging, in every part of the city and suburbs, at depths varying from ten to thirty feet. This was formerly soft and excellent, before the contamination incident to the extension of the city, and the usual infiltrations. The water now used is supplied in the greatest abundance from the water-works erected on the Schuylkill, north-westward of the city. The whole

district over which the population of Philadelphia is spread, as well as the adjacent country, which is generally of the primitive formation, admits of the most perfect drainage.

The plot of the city proper, forms a parallelogram of a mile in width, from north to south, and about two miles from east to west, or from river to river. But the town has so far overrun the original lines surveyed by Wm. Penn, that by far the larger portion of the population reside in the adjacent districts, which constitute, as it were, so many distinct wards.

According to a calculation made by Dr. G. Emerson, for this Report, the population of the city and liberties at the present time may be computed at 320,000, including only those sections of the county making returns of births and deaths to the Health Office, and subject to the regulations of the Board of Health. This estimate is founded upon the supposition, that the ratio of increase continues the same as between the census of 1830 and that of 1840, viz., about three and a-half per cent. per annum. The births and mortality per annum, as well as for the several months, are given in detail, in a highly valuable paper, published in the American Journal of Medical Sciences for July, 1848, by Dr. Emerson, under the head of "Vital Statistics of Philadelphia," together with the proportion of white and coloured inhabitants, &c. This, with other papers in former numbers, by the same author, embracing a period of twenty-four years, will be found exceedingly interesting to those who desire to pursue the subject.

"*Query 2.* What is the character of Philadelphia in reference to health? What is the condition of its most unhealthy and crowded parts, where disease is supposed to be most prevalent, and to what causes are such diseases mainly attributable?"

Ans. The general character of Philadelphia for health, is perhaps equal to that of any large city in the world; and had the designs of the illustrious founder been fully carried out, it is probable, that a still greater immunity from disease than now exists would have been enjoyed. The rectangular arrangement of the streets, extending for the whole breadth of the city North and South, and East and West between the two rivers; their ample width, and convenient level for drainage; the natural advantages of surface and soil; the ample supply of pure water, with wholesome regulations to preserve cleanliness, might well give to Philadelphia a high range of health. But in the rapid progress of population which marks all the cities of the New World, and in which this has largely participated, features

have been engrafted upon the original plan which have added greatly to the sources of disease, and have marred the beauty of the primitive design. Amongst these, may be mentioned the building up of the river front of the city with massive structures, which cut off the air and the view of the river; and the construction of a narrow street surrounded by high buildings between the river and the natural bank which rose up from its shore. This bank is described, by the early pioneers in the settlement of the city, as a beautiful, elevated hill, which skirted the shore along the front of the city, and upon its top was laid out the broad and spacious street called Front street, now one of its great business thoroughfares. It was the design of Penn, that the space between Front street and the river should be kept open, and that the bank should be laid out as a shaded promenade, along the whole line of the city, to be used as he expresses it, "as a common exchange or walk," with wharves opening on the river below, thus forming a beautiful quay for the securing of vessels, the unloading of merchandize, &c., but that no buildings should be erected on the east side of Front street. It was not long, however, before the holders of lots on Front street, began to urge their claim to build vaults or store-houses in the bank against their respective lots; these applications were at first firmly resisted by Penn, who allowed them the right of building stairs to the top of the bank, but not to encroach in any way upon the public promenade.

As early, however, as 1690, grants to build on the wharves and in the bank were made to some few special friends; and on William Penn's second arrival in the colony, in 1699, after an absence of some years, he found, to his great regret, that serious encroachments upon his plan had been permitted by his agents, and that a permanent deformity had been inflicted on the city. Buildings in the bank, and on the wharves proceeded, and, as early as 1705, they had progressed so far that the owners were called upon to regulate a street between these buildings; and, following out the same selfish policy which had induced the first departure from the proprietor's plan, they laid out the present unsightly thoroughfare, called Water street. The eastern front of Philadelphia was thus intersected by a confined, irregularly built, and narrow avenue, which has since served as a focus for disease and pestilence, instead of presenting a beautiful, open promenade, which would have diffused health and salubrity to the inhabitants.

As an evidence of the fatal error which was thus early committed, it may be mentioned that the several yellow fever epidemics which

have scourged Philadelphia, have commenced their ravages in this section of the city; and that other infectious disorders are very apt to spread from this point. Houses built upon the side of a natural bank cannot of course have a back outlet, and hence the tenements on the west side of Water street, which are occupied as the residences of the poor, or as taverns for the accommodation of sailors, emigrants, &c., are without yards, privies, or any means of ventilation, while they are generally overcrowded by a population peculiarly liable, from their habits, to disease. Under these circumstances, it is not surprising that, when an alarm of an infectious disorder prevails, the attention of the citizens should be involuntarily turned to the condition of Water street, and of the river front.

So great an evil has this been regarded, that it has more than once been seriously urged by public-spirited citizens, to restore the plan of Penn, so far at least, as to tear down the buildings along the bank side of Water street, opposite the most densely built portions of the city proper, and to open a shaded promenade in their place.

This proposition was urged by a committee of distinguished physicians, who presided over the sanitary condition of the city during the cholera epidemic of 1832; and they presented an able memorial to the city councils, setting forth its advantages to the future health and prosperity of the inhabitants. The immense expense attendant on such a measure, was, however, considered as an insuperable barrier to its accomplishment, and the project was therefore never seriously entertained.

The unhealthy condition of this portion of the city, was also a subject of serious thought to the late Stephen Girard; and he has added greatly to its improvement, by a munificent bequest of half a million of dollars, the interest of which is appropriated under the direction of the city authorities to the widening of Water street, and to the laying out of a spacious street along the river front, now known as Delaware Avenue.

These improvements, together with the substitution of store-houses for human habitations, which is gradually progressing along this line, will remove many of the nuisances, which have long existed in this section of Philadelphia, and render the eastern front more salubrious and inviting; thus diminishing our regrets that the wise counsels of Penn did not prevail.

Another source of insalubrity in the river front, is the mode

adopted of constructing the wharves with timber instead of stone, which prevails in Philadelphia.

The constant wearing of the water against the wood causes infiltration and decay, and thus cavities are formed which give lodgment to vegetable and animal refuse floating in the river, and keep up a degree of moisture, which, at certain seasons, may generate disease.

Extending our inquiries into the interior of the city, we may trace a large amount of disease, which prevails in certain localities, to a still further departure from the primitive design of the sagacious founder.

In the original city plot, no provision was made for the small streets, alleys, and courts, which are now so numerous. The design of Penn was to divide the city into squares, or blocks, with the houses fronting upon the four sides; the interior of the square being kept open for garden plots, outbuildings, &c., with perhaps an occasional narrow avenue or private alley, for the accommodation of the property owners in the neighbourhood.

But, with the increase of population and trade, and the enhanced value of ground, these spaces were soon encroached upon by buildings, the private alleys began to be built upon, and were, in process of time, dedicated to public use, while new ones were projected, and lined with small buildings for the accommodation of an humbler class of citizens, whose means would not enable them to live upon the principal streets.

Thus commenced the system of building up courts, alleys, and lanes, which has since proceeded unchecked, and has multiplied the causes of disease to an extent which calls loudly for reform.

It was scarcely to be anticipated that no innovations upon the original plan would occur, especially as the size of the squares was more ample than the necessities, or even the comfort of the inhabitants required; but it is unfortunate for the health and beauty of the city, that no effort was made at an early period to regulate, by law, the mode of building, and to adapt it, as far as possible, to the admirable intentions of the founder.

Had the squares, for instance, been intersected by wide open streets running at right angles, upon which small and neat buildings, with moderate sized garden plots could have been erected, thus securing to each house a free ventilation, no serious evil would have accrued; while a large number of inhabitants, of moderate means, would have been accommodated.

Unhappily, however, private cupidity was allowed to operate unchecked, and owners of property, eager to realize the largest income from their estates, were permitted to build upon these open spaces in a mode detrimental to the public health. Narrow alleys, and closed courts were projected and compactly built up with small houses, oftentimes without yard room, or back outlet of any kind, and under the private control of the owner.

Alleys of twenty feet wide and upwards, running through the square, and open at both ends, are, of course, less objectionable than closed courts.

These alleys, or small streets, are paved, curbed, and lighted by authority of the city, and are under its control. The houses upon them are furnished with yards, which, though often confined and filthy, still furnish sufficient space for privies, hydrants, &c.; and allow of a circulation of air through the house, and of the access of sun light by back windows opening upon them. In the closed courts, and in some of the smaller alleys, on the other hand, these arrangements do not exist. These courts are usually laid out upon deep lots, fronting upon a small street or alley, and well adapted to several buildings, with ample yard room back; but such buildings would yield a much smaller income, than that derived from a row upon each side of the lot, extending backward through its whole depth. A lot, for instance, of forty feet front, by one hundred feet deep, encompassed by a high wall upon each side, and fronting upon a narrow street, would accommodate three small houses with large back yards; but the same premises, laid out as a court, would give place to seven or eight houses upon each side, with a common outlet of eight or ten feet wide, upon the alley. In such a court, the houses are, of course, built against a dead wall, and unprovided with any means for the access of air or light in the rear; they are without privies, or hydrants, and from the height of the surrounding walls, and the confined situation of the street on which the court has an outlet, it is often deprived of currents of air through it, and from the access of sun light, except during a small portion of the day.

At the upper end of such courts, a hydrant, to be used in common by the occupants, is placed, and near by a range of privies; which, in warm weather, infect the atmosphere with a sickening effluvium; while, in some instances, the privy is even placed in the cellar of each house, which is still worse.

There is another description of court quite common in Philadel-

phia, even more confined than this. A row of small tenements is built upon the rear of a lot of ordinary dimensions, upon which is erected a substantial wide building, fronting on the street.

The space which is ordinarily appropriated to back buildings, and to a garden plot, is filled up by a compactly built row of houses, the only entrance to which is through a four feet wide alley, opening out upon the street along side of the front building. In this confined space, a number of families are housed with a dead wall in front of them, and no outlet back; without the luxury of sun light, and a very deficient supply of fresh air. Many such pent up courts are to be found in the thickly settled portions of Philadelphia, the existence of which is, perhaps, unknown to the great mass of the citizens. While they fill the coffers of the greedy proprietor, they inflict disease and discomfort upon their needy occupants.

That confined courts and alleys should be numerous in the thickly settled parts of the city, where the high value of ground holds out a strong inducement to appropriate it in this way is, perhaps, not surprising; but the evil also prevails, and is increasing in the recently built portions of the city and districts, where property is comparatively cheap. The beautiful section of the liberties called Spring Garden, in which are some of the most tasteful private residences and public buildings to be found in Philadelphia, most of which are of modern construction, is already defaced by this system of building courts and alleys, and will probably be still further spoiled, if some legal check is not placed upon it.

The same irrational system of building houses against dead walls, without back windows, yard room, hydrants, or privies, prevails here, and for the same reason, viz.: because, in certain localities, such a plan will yield to the property owner a larger income than by pursuing the ordinary method.

To illustrate the extent to which this system prevails in the city proper, we may mention a fact, elicited by a slight survey of a chart of the city, in the office of the city surveyor.

In two blocks, not far distant from the centre of business, and selected without reference to any pre-eminence in this respect, it was found that, in one, *six compactly built alleys*, and *five closed courts* existed, and in the other, *four alleys* and *seven courts*.

The front buildings on the four sides of these squares, were for the most part neat and substantial private residences, and some of them conspicuous for these qualities, while the interior of the squares

were thus compactly built up, and densely crowded with population.

Your reporter made some effort to ascertain the number, dimensions, population, &c., of these confined courts and alleys, within the city limits, but found the inquiry too extensive to be prosecuted at present.

The attention of the Sanitary Committee of the Select and Common Councils, and of the Board of Health was, however, solicited to it; and partial returns from several districts were presented through the collectors of vaccine cases, as will be found, in the interesting report herewith presented, of the Joint Special Committee of the Councils, to whom was referred the circular letter of our committee.*

The subject of the construction of houses for the poor in large cities, is one of great importance in its relations to the public health.

In these habitations children are reared, and during their infantile years, they are confined very much to them. The crowding together of a large number of families in confined courts, such as we have described; the accumulation of filth and offal, which must inevitably take place in those localities; the excessive heat and closeness of the atmosphere in summer, and the over-heating of the houses by coal stoves in the winter; the foul smell from privies, and the absence of hydrants to each house for the promotion of cleanliness, are so many causes of disease.

We hazard nothing in saying that the seeds of scrofula and consumption are sown here; and that the more acute diseases, which are distinctly traceable to a deficiency in the supply of the natural elements for sustaining and developing the frame, must prevail in these confined situations. Happily, the instincts of childhood lead the young being beyond the narrow confines of his cheerless home, and, when his strength will permit, he is prompted to active sports in the open air, which counteract, in part, the deleterious influences by which he is surrounded in doors; so that, in spite of these, his constitution, if naturally good, may become established on a firm basis; but still, many perish before they are capable of seeking for

* By this report, we observe that in the north-east district of the city, embracing the squares from the south side of Vine street to north side of Chestnut, and from east side of Ninth street to Delaware avenue, upwards of fifty courts and alleys are reported; in most of which there is no ventilation, and in the rest, it is stated to be very defective. In many instances, two or three families live in one house, and the premises are reported as filthy. In the south-east district, embracing the same extent of surface, forty courts and alleys are noted; and these numbers are believed to be below the truth.

themselves the air and light of heaven, and of establishing their claim to these natural gifts.

The amount of infant mortality, in Philadelphia, believed to be traceable to a combination of heat, moisture, and impure air, in confined situations, is sufficient to excite anxious inquiry. Cholera infantum, and other chronic bowel diseases, which annually carry off such a large number of children during the heat of summer, are known to be greatly influenced in their origin and progress by these causes. The cause of a large portion of these cases is as obvious as though it were tangible, and the cure often depends simply upon the removal of the patient from the crowded court or alley, to the pure air of the country. During a period of ten years, from 1838 to 1847 inclusive, 2,936 deaths are reported as having occurred from cholera infantum, and 119 deaths from teething, in the districts reporting to the Board of Health. How many of these deaths came from the closed courts, crowded alleys, and illly ventilated abodes of the poor ? We imagine, without any means of accurate information, except a somewhat extended personal observation, that a large proportion could be traced to these situations; and, hence, that they were, in a great measure, dependent upon removable causes.

During the same period, there were reported 2,450 deaths from convulsions, in children under two years of age. May not many of these be fairly attributable to the same influences ?

In addition to the infantile diseases, these localities form foci for infectious disorders, during those epidemic visitations, which occasionally afflict large cities, or which are transported from other places; small-pox, ship or typhus fever, and other like disorders, originate and spread here, with a rapidity and a fatality not observed in more open situations. Several typhus fever epidemics which have visited Philadelphia within the past few years, have originated and been almost entirely limited to a crowded and filthy section of the district of Moyamensing, amongst a class of depraved inhabitants, who live in confined courts and cellars, exposed to the inclemencies of the weather. Small-pox may also be traced to the same districts; and were it not for the rigid municipal regulations, which require the immediate removal of patients affected with these diseases to hospitals, and the evacuation and cleansing of the infected district, there would, no doubt, be a frequent extension of these disorders to other sections of the city.* The sanitary condition of some of the

* The influence of these confined habitations upon the health of the neighbouring city of New York, has been ably investigated by Dr. John H. Griscom, of that city. He

large cities of Great Britain, is known to be greatly influenced by the evil of which we complain, with the additional cause now operating of a deficient supply of food, which is, unhappily, experienced by many of the poor who live in these wretched habitations. In some of the cities and large towns of that country, the mortality from diseases induced by causes, which, in a more favoured state of society, do not exist, is frightful, and furnishes a sad commentary upon the civilization and philanthropy of the age.

It is, however, gratifying to perceive that the condition of these unhappy sufferers is attracting the attention, and arousing the efforts of some of the first statesmen and philanthropists of that nation, and that a thorough investigation into the sanitary condition of towns, and into the removable causes of disease, is now in progress. Health of towns' associations are formed, parliamentary committees are appointed, and the sanitary question has taken its rank amongst the leading topics of public concern.

In the United States, we are more favourably situated, in these respects, than in the older cities of Great Britain and the continent. Our cities are comparatively new, and most of them are in the progress of rapid growth; so that now is the time to guard against errors of construction, and a system of over-crowding, which have inflicted such heavy, and, it is to be feared, irremediable calamities upon the towns of the old world. It is the opinion of the writer, as well as that of the committee with which he is associated, that the construction of dwellings should be, to some extent, under legal control; so far, at least, as to prevent the building up of confined courts and alleys, or of houses without provision for privies, hydrants, and a certain amount of open space in their rear. Surely, the protection of human life is one of the highest and noblest ends of government; and if a sordid self-interest interferes with the public good, by depriving any portion of the honest and industrious poor, of those natural elements, essential to the preservation of

has ascertained, that the females living in these situations, suffer much more from disease than the males, whose occupations lead them more into the open air, while the women are confined to this polluted atmosphere during the greater portion of the time.

"It will be seen," says Dr. G., "upon examining the dispensary returns, that in some years the proportion of females to males prescribed for at the dispensary, has been as 12 to 10½; in others, 12 to 8½, and, in one instance, as 19 to 11. This comparison is rendered more striking, when we take into account the greater amount of intemperance among the males." "See Sanitary Condition of the Labouring Population of New York, with Suggestions for its Improvement," &c. By John H. Griscom, M.D. New York, Harper & Brothers, 1845.

health, it should be within the province of the State to interpose its authority to prevent it. This principle is recognized in the powers given to Boards of Health, and other municipal bodies, to remove nuisances, &c., and should, we think, be extended much farther than is now generally regarded as essential. If, for instance, it can be shown that the method of building to which we have referred gives origin to a multitude of diseases which might be avoided under a more rational system, and that a large amount of mortality is distinctly traceable to it as a cause, it is certainly the duty of the legislature to pass laws which shall effectually prevent this unnecessary exposure of human life. The law regulates the laying out and grading of streets; it fixes lines and defines the limits of estates; it declares even that no *frame* buildings shall be erected, within the city limits, for fear of fire, which may endanger the surrounding property; why may it not, with still greater propriety, control the construction of houses, so far as to secure to their inhabitants a due supply of the elements so bountifully furnished by nature for the sustenance and strength of man? Nowhere is such legislation more imperatively demanded than in the cities of the New World. The climate of our temperate regions is subject to greater extremes than are experienced in the central portions of Europe, while the hot weather of our summers superinduces many diseases almost unknown in those countries, thus tending to aggravate the miseries of confined and over-crowded localities. If, therefore, the municipal authorities do not move in this matter, it is greatly to be feared that the large and flourishing cities, which are now rapidly rising up in different sections of the Union, some of which will, ere long, vie with the largest towns of the Old World, in wealth and population, will be permanently defaced, and their facilities for diffusing health and comfort for ever impaired, for want of such timely interference. For while taste and elegance may adorn the mansions of the rich, and increasing splendour may mark the structures which public munificence or private enterprise rears to charity and science; yet, if the dwellings of the poor are neglected, if the light and air of heaven are shut out from their abodes, and avarice is allowed to feed and fatten upon their helplessness, we shall fail in establishing cities worthy of that high destiny to which our country aspires. It is the boast of the Republic to regard with an equal eye the happiness and interests of all classes, and especially to throw the ægis of its protection around those who, from adverse circumstances, may be exposed to privation and suffering, at the hands of their more

favoured fellow-citizens; let our legislators, then, be inspired with the genius of our institutions, and act upon this principle, and the work which we advocate would be speedily accomplished.

Your committee would therefore respectfully urge upon the attention of the authorities of the large towns and cities of the United States, the subject of the construction of houses, and of the proper arrangement of streets, avenues, &c., within the town limits, as one intimately connected with the health and civilization of their respective communities, and eminently worthy of their regard.*

There are other causes of disease existing in Philadelphia, which will be more appropriately noticed under other heads of this report. We would briefly refer here to the prevalence of malarial fevers in the thinly settled districts lying between Broad street and the river Schuylkill, and in the low, flat lands to the south of the city, situated between the Delaware and Schuylkill, familiarly called the "Neck." There were formerly many brick ponds, or other smaller collections of stagnant water scattered over this portion of the commons of the city, which were the fruitful source of autumnal fevers, generally of the intermittent type; these, however, are gradually disappearing, as pavements and buildings are extended in this direction—so that many localities which, a few years ago, were subject to these fevers, are now entirely clear. There has been, however, during late seasons, a prevalence of this class of disorders in the southwestern and northwestern suburbs, bordering on the Schuylkill, as well as some cases of dysentery which appeared to be dependent on the same causes. It is confidently believed, however, that, in the progress of building, these diseases will entirely disappear, as no case of intermittent or remittent fever is known to have primarily originated within the compactly built portions of the city.

In the "Neck," and along the banks of the Schuylkill in the vicinity of Philadelphia, it is probable that malarial fevers will continue to prevail at certain seasons, although there is an unaccountable irregularity in their visitations. For a series of years, fevers were so prevalent that many beautiful country seats were abandoned by their proprietors, and sold out at very low prices, while an ex-

* As a preparatory measure to proper legal enactments on this subject, the institution of sanitary surveys, under the direction of the municipal authorities, would become necessary. These surveys would include an accurate investigation into the condition of confined and crowded localities, with a chart of the town or city, which should reveal at a glance its interior arrangement, and thus enable the proper officers to act understandingly.

emption for a few succeeding years partially restored confidence, and caused them to be re-occupied, to be again deserted by their new owners, at the occurrence of another epidemic.

It is believed by many that the construction of the dam on the Schuylkill, at Fairmount, has contributed largely to render these suburbs unhealthy; and there is, perhaps, no doubt of the fact; though during some seasons, as, for instance, in the autumn of 1847, there were many cases of fever along the banks of the river below the dam, and in the sections of the city before alluded to.

Drainage, &c.—Philadelphia enjoys great advantages in the facility with which a system of drainage may be carried out. It has the natural advantages of surface and soil, together with a careful regulation of lines and heights in all the streets, lanes, and courts, embraced in the limits of the city and districts, which proves amply sufficient for this purpose. The water is carried off by means of common sewers, at the corners of the principal streets, which are generally sufficient, though the opinion is expressed by Marine T. Chandler, assistant city surveyor, that an increase in the amount of sub-drainage would be advantageous. (See letter of M. T. Chandler. *Report of Joint Committee of Select and Common Councils, on Public Hygiene, &c.*, p. 12.) The public sewers vary in size from three to ten feet in diameter in the clear, and with their branches, amount in the aggregate, at the present time, to eleven and three-quarter miles, more than four and a half miles of which are discharged through the Dock street sewer into the river Delaware; it is in contemplation to construct another sewer at Walnut street, to take off a portion of this drainage, and to accommodate additional branches which the increasing accumulation of water may require. In the surrounding districts, the sewerage amounts to fifteen and three-quarter miles. The cesspools at the inlet of the sewers are apt to become filled up with putrid filth, thus impeding the course of the water, and sometimes during heavy rains causing a temporary overflow of the gutters; to prevent this, these inlets are frequently cleaned out, by raising up the mud which collects in them and depositing it on the pavement; a practice which, in hot weather, causes the surrounding atmosphere to be charged with a sickening effluvium. If some other plan of cleansing these inlets could be devised, it would no doubt add to the health and cleanliness of the city. (See letter of Samuel Haines, City Surveyor, pp. 17 and 18. *Report on Public Hygiene.*)

The plan of flushing, by copious effusions of water into the sewer, so advantageously adopted in Great Britain, might be introduced into our cities with great benefit. The trapping of the sewers, for the purpose of preventing the emission of noxious gases from the inlets, has been partially attempted in Philadelphia, but with results altogether inadequate for the purpose. As this has, however, been well accomplished elsewhere, it is presumed that further experience will perfect it here. The great mass of the drainage of the city and districts is necessarily surface drainage, inasmuch as the densely *built* area of the town occupies but five *square* miles, while the total amount of sewers is but twenty-seven miles in extent.

The drainage by these arrangements would be amply sufficient, were the municipal regulations to enforce cleanliness strictly adhered to. It often happens, however, that obstructions occur from the collection of offal in the gutters deposited in violation of the law, thereby adding to the causes of ill health. Another impediment to a perfect system of drainage, consists in the mode of paving the streets and carriage ways of the city with rounded pebble stones, the interstices between which furnish a lodgment for dirt and water, much of which percolates into the stratum below. The substitution of cubical blocks for the present method of paving would in a great measure remedy this difficulty. If sub-soil drainage of the pavements, where practicable, were resorted to, the effluvium and moisture arising from them would be further diminished, and their durability and level more perfectly maintained.

There is, also, in certain *portions* of the districts recently settled, and in some of the courts and alleys in these localities, an entire deficiency of pavement, and consequently of adequate drainage; and even in some of the old portions of the town, especially in Moyamensing, a few alleys are still unpaved. As the spirit of improvement progresses, and new buildings are erected, this difficulty is rapidly disappearing.

Cleansing, &c.—The streets are cleansed by contract, with some exceptions, once a week; the contract in some instances being given to the highest bidder, the value of the street dirt being held, not only as an equivalent, but as a source of revenue to the contractors. The mode adopted is as follows.

The streets are first watered in dry seasons, and then by the application of large birch brooms, aided by iron scrapers for the gutters, the dirt is gathered into heaps, on either side of the street,

taken up by carts, and deposited on vacant lots, subjacent to the outskirts of every district appropriated for the same by the several municipal authorities. From thence it is sold to the neighbouring farmers as manure. The kitchen offal and slops from houses, are generally collected by covered water-tight carts, sent round on particular days through the week, taken out of the city, and the most of it converted into swill for hogs, while the dry refuse, from houses, is collected in the same manner and sold for filling in lots and streets in the new and outer precincts of the city and liberties. (See Communication of Board of Health to Committee on Public Hygiene,—herewith presented.)

Some streets are cleansed by the above method twice in each week, and others once a week; and all the paved courts, lanes, and alleys within the city limits are included in the contracts. *Unpaved* avenues are not so cleansed, and complaints are often made that the confined courts and alleys receive less attention than the larger and better ventilated streets. (See Communication of Board of Health.)

The contractors further engage to remove the kitchen offal which may be placed by housekeepers in some convenient place, *daily*, from the first day of June to the first day of October, three times a week during the months of May and October, and twice a week during the other months of the year; and also completely to cleanse and wash the market-houses, twice in each week, from the first of May to the first of October.

The efficacy of the above regulations depends both upon the fidelity of the contractors, and upon the carefulness of housekeepers. Lapses of duty in the former can generally be detected, and remedied by the proper authorities; while carelessness in the latter is not so easily reached. Upon this latter point, we are impelled to quote the following remarks of Charles A. Poulson, Esq., the Chairman of the Committee of Councils, to whose report we have so frequently had reference. "But the deficiency in cleanliness most to be dreaded," say the committee, "exists even in our midst, from a careless or culpable want of this virtue in private residences. It must not be concealed, that this grievous evil does not obtain *solely* in the habitations of the poor and destitute, in lanes, in courts, and in alleys; but actually exists also on the premises of persons whose means are adequate to procure a better state of things; where there are cellars, vaults, sinks, privies, and other secret and hidden depositories of filth to be found, in some cases we may, perhaps, charitably hope unknown to those most immediately interested—

heads of families." Another source of insalubrity arises from several open drains, or natural water-courses in the districts (but not in the city proper, where they also existed in former times, but have been converted into sewers). These are gradually undergoing the same process, and in the progress of improvements will, no doubt, be soon obliterated. The numerous piggeries within the limits of the city and districts, furnish a source of insalubrity, which is much complained of. In some of the narrow alleys and courts, inhabited by the poor, large numbers of pig-sties are to be found, sending forth their noxious gases, and thereby adding another to the already accumulated causes of disease in those confined situations; while the existence of large piggeries, in the open lots around the city, sometimes infects the atmosphere of the whole neighbourhood.

Ventilation of Public Buildings.—Most of the public buildings of Philadelphia, including court-houses, school-rooms, places of public worship, lecture-rooms, halls devoted to scientific purposes, hospitals, prisons, &c., are provided with no means of ventilation, except by casual opening of the windows and doors. A few are provided with the additional contrivance of one or more openings in the ceiling, sometimes connected with louvers in the roof, which afford partial, though by no means free ventilation. A small number of houses of worship and school-houses, have recently resorted to forced ventilation, by means of fires in lofty flues or chimneys, but in no instance, that we know of, has this plan been perfected so as to secure a pure atmosphere at all times and seasons.

The west wing of the Pennsylvania Hospital, devoted to the female patients, is believed to be the best ventilated building in Philadelphia, and is scarcely equalled by any similar institution in the Union; the apparatus for warming and ventilating are combined, so as to render the atmosphere comparatively pure, and well-tempered during the cool seasons.

Ventilation in the prisons of Philadelphia, is especially faulty; and the want of it is believed to be a fruitful source of disease in these establishments. The absence of a sufficient supply of pure air, is particularly felt in prisons conducted on the plan of separate confinement, as in Pennsylvania; inasmuch as the convicts are confined to their cells both day and night, and have no opportunity for exercise in the open air; except during an hour each day, in a small yard attached to the cell. In the congregate prisons, on the other hand, where the ventilation of the cells is equally bad, the prisoners

spend the day either in working in the open air, or in spacious workshops, and are exposed to the confined air of the cell only during the night.

The school-houses are also generally badly ventilated, though in some, recently built, greater attention has been bestowed upon this subject. The evils of defective ventilation in these institutions are especially worthy of regard. In them, children, whose constitutions are in the process of formation, spend some five or six hours during the day, engaged in mental labour, and subjected to the necessary discipline of a school. It often happens too, that the school-rooms are over-crowded, and during cold weather the windows are kept tight, and they are heated by red-hot coal stoves, or by furnaces in the cellar, a combination of circumstances eminently injurious to health, at an age when the constitution has need of a full supply of the agents which nature has furnished for its development and support.

Since the introduction of anthracite coal, the ventilation, both of public and private buildings, is more defective than formerly, when houses were chiefly heated by wood in open fire places, although the degree of warmth and comfort is greater than by the old method.

The introduction of furnaces in lieu of the open grates, is also believed to have diminished the purity of the atmosphere, by introducing air into the room at too low a dew point, and charged with dust.

The heated air is also apt to be impure by containing a portion of the gases resulting from the combustion of the coal, and from the decomposition of the dust, which is always floating in the atmosphere; where open fires are employed as auxiliary to the furnace, as is now done in many private dwellings, the ventilation is improved so far as the quantity of air is concerned, though the quality remains the same. As furnaces are now generally constructed, their influence upon life and health must be more or less prejudicial; and it is greatly to be desired, that a reformation in this mode of heating should be speedily effected.

The ventilation and heating of the houses of the poorer classes, is also intimately connected with the public health. In many of the sleeping apartments of these houses, especially those built in confined situations, there are no flues, chimneys, or other apertures for the passage of air, and in these rooms four or five persons often sleep. Other small houses are supplied with flues or small chimneys, which are closed up in winter, and the rooms heated by close

coal-stoves. In either case, the deprivation of air must be exceedingly injurious, especially to young children.

Public Squares.—Philadelphia is justly celebrated for her beautiful public squares. Four of these, occupying positions intermediate between the river Delaware and Broad street, and between this street and the Schuylkill, and originally known as the north-east and south-east, and north-west and south-west squares, were laid out in the first settlement of the city, by Penn himself, and devised to the city, to be for ever kept open as public grounds, and used as Moorefields, in London, for a free circulation of air and recreation.

Each of these squares contains eight acres of ground; they are beautified by handsome shade trees, and are kept in order by the city.

Besides these, Wm. Penn laid out a plot of ten acres, near the centre of the city, and on the main thoroughfare between the two rivers, which he intended as a site for the public buildings, when the city should become large and populous.

This was called the Centre Square, and, like the others, was devised to the city, to be kept open as a public ground. In the early settlement of Philadelphia, this spot was a beautiful piece of woods, in the midst of which stood a Friends' meeting-house, and subsequently it became the site of a handsome edifice, which was a receiving fountain for the first water-works on the Schuylkill, erected in 1799. After the erection of the Fairmount works, this structure was demolished, and the square became again a public common.

Unfortunately, however, it was not allowed to remain open, as originally intended, but was intersected by two wide streets, and surrounded by another, thus seriously curtailing its original dimensions, and dividing the remainder into four small open spaces, which have recently been dedicated to public use, and are but partially improved.

A project is now on foot, to cover these desirable open grounds with four huge buildings, to be used as depots for the railroads which meet at this point, and the mercantile interest is clamorous for this further encroachment on the original design of the founder. If public health and salubrity are to be considered paramount to moneyed interest, some other spot will be selected for this purpose, and Philadelphia will be spared this additional infliction upon her fair proportions.

Another beautiful square, not included in the original plot of the

city, has since been added, namely, Independence Square, upon which are located the public buildings, so celebrated in the history of our country. This ground originally belonged to the State, of whom it was purchased by the city corporation, to be appropriated as a public square. It is planted with magnificent shade trees, and is, in common with the other squares enumerated, greatly admired for the neatness and taste with which it is kept.

In addition to these open grounds within the city limits, the corporation has wisely appropriated the grounds at Fairmount to public use, and has ornamented them with a degree of taste and elegance highly creditable to the city. This beautiful spot, easily accessible by omnibuses from all parts of the city, is the resort of thousands of the inhabitants, and is admirably adapted for healthful recreation.

In the districts of Philadelphia, including a much larger space than the city proper, and crowded in many parts with population, no provision has yet been made for public squares.

This is the more to be regretted, from the fact, that ground is now comparatively cheap in many portions of these districts, and that many spaces, now open, would furnish admirable situations for public squares. In the districts of Spring Garden, and of Penn, situated to the north-west of the city proper, there are many beautiful hills overlooking the city, now open commons, which, at a moderate cost, might be secured to these corporations, and appropriated to public use; whereas, if the matter is allowed to rest for a few years longer, the march of improvement, which is rapidly extending in this direction, will level down these commanding eminences, and busy thoroughfares will take their place.

The importance of public open grounds, in the midst of a crowded city, to the health of the inhabitants, was fully appreciated by the founder of Philadelphia, in his first plan, and his foresight has secured to the inhabitants those which they now possess. He looked, not only to the immediate necessities of his own times, but to the welfare of future generations. A more contracted policy seems now to prevail; and the future healthfulness and beauty of the extensive districts which have grown up around the city, and which vie with it in wealth and population, is now in danger for want of a spirit of liberality, which would disregard an immediate outlay, where a great future benefit was to be attained.

Supply of Water.—Amongst the sources of health and salubrity

with which Philadelphia is favoured, is an abundant supply of excellent water. This is derived from the river Schuylkill, through the admirable works located at Fairmount. The water is pumped by machinery into reservoirs built at the top of the mount, and from thence is distributed through the city.

The main trunks, proceeding from these reservoirs, are so arranged as to admit of the subsidence of any sediment, which may exist in the water, previous to its passage into the smaller pipes which carry it onward; and, except after great freshets in the river, when the water is apt to be turbid for several days, it is drawn from the hydrants in a very pure state. It is estimated, by the Superintendent of the Water Works, that the average number of days in the year, in which this impurity exists, is about twenty. "The water is conducted into the city by two principal iron mains of twenty inches diameter; from these are carried lateral mains, varying in size from three to sixteen inches diameter, and extending, in the city proper alone, nearly seventy-five miles."*

The water is carried into all the main streets of the city, and into almost all the public lanes and alleys east of Broad street, but between that street and the Schuylkill, the distribution is not so complete; this being regulated chiefly by the number of houses in the street. It is not known what proportion of houses in the city are furnished with hydrants; but it is supposed that at least 3,500 families obtain their supply of water from the public hydrant pumps, which are placed along the principal streets.

The districts of the Northern Liberties, Spring Garden, and Kensington, lying north of the city proper, are supplied with water by a distinct set of works, under the control of these corporations; and since their opening, the distribution in this direction has been greatly increased.

The number of baths in private houses, receiving their supply from Fairmount, was estimated in 1847 at 3,521; while the number of tenants who paid for a supply of water during the same year was 15,205 in the city proper. From this, it appears that the number of baths bears a small proportion to the private hydrants existing on the premises of the inhabitants; a fact which would seem to indicate that the practice of bathing was confined to a comparatively small number.

* Letter of Frederick Graff, Superintendent of Fairmount Water Works. Report of Joint Special Committee of Select and Common Councils of Philadelphia, on Public Hygiene.

A rapid improvement is, however, manifest in this respect; and in most of the houses recently erected on the main streets, or now in progress, conveniences for bathing are furnished—and a bath-house is considered indispensable to domestic comfort. There is, however, a general absence of bathing apparatus, and even of hydrants, in the houses of the poorer classes, and especially in the confined courts and alleys in the populous districts of the city. This is a great evil, and calls loudly for public interference. A regulation, enforcing the introduction of water into every house, would, it seems to us, fall within the powers of municipal bodies. Upon this point, in reply to ninth query of the committee, touching the effective administration of existing ordinances, in regard to health, the Sanitary Committee of the Board of Health remark: "The agents of municipal bodies execute the orders of the body they represent; but it is believed that a very short-sighted, circumscribed policy obtains too generally in the administration of local ordinances, with reference to public health in the *free use of water*, which it should be made obligatory to have introduced into every house erected, however small. By facilitating the means of frequent bathing in families—particularly the poor and labouring classes—the effect would soon be apparent, by removing a prominent cause of disease, and contribute to the moral, as well as physical improvement of the lower classes of society."

But five public baths exist within the city limits, and one in the district of Spring Garden; and the entrance to these is at a cost which excludes a large proportion of the inhabitants who are without the facilities of bathing at their own houses. Could the system of model bathing-houses and cheap baths, be introduced here as in some of the cities of Europe, it would add greatly to the public convenience, and be promotive of health. By this plan, the means of bathing, at least once a week, would be furnished to the labouring population, while the private interest of no one would suffer.

A benevolent institution, recently established in the district of Moyamensing, for the purpose of furnishing employment to the poor, have connected within their building a range of baths, supplied with hot and cold water, to which access is had by tickets, furnished at the rate of three cents each, or by its equivalent in labour. Such an arrangement is highly commendable, and has, probably, been the means, in this instance, of furnishing baths to many poor creatures in this section of Philadelphia, who have never before enjoyed that luxury; and who, from their filthy condition, are peculiarly in want

of it. The multiplication of such establishments, especially in parts of the city inhabited chiefly by the poorer classes, and open at a mere nominal cost, would be an excellent practical measure of benevolence; and would, we believe, diminish the liabilities to disease amongst a large class, who are now much exposed.

The quality of Schuylkill water is excellent, both for drinking and for domestic purposes; but four or five grains of foreign matter are contained in a gallon; and of this, one-half is carbonate of lime, obtained in its passage through the limestone region in the vicinity of the city.

The supply furnished to the city is ample, and the means of increasing it, when necessary, easy.

At present, it is estimated that each tenant receives, on an average, 179 gallons per day; and, allowing six persons to a family, 30 gallons daily to each individual.*

In order to secure the water from contamination by manufactories, sewers, &c., located above the dam, the city corporation have recently purchased the ground, skirting the river for some distance above the water works, which it now holds as public property.

The conversion of this attractive spot, once occupied as a country seat by the late Henry Pratt, and celebrated for its beautiful gardens, into a public square or park, which should be thrown open to the citizens, and be connected with the grounds at Fairmount, would add additional attraction to this favorite place of resort, and constitute an important link in that chain of influences which counteract the deleterious effects upon health induced by the evils of a crowded population to which we have referred.

Prison Discipline in Philadelphia.—A resolution passed by the Association, at its last meeting, directs the attention of the Committee on Public Hygiene to “the effects of confinement in prisons and penitentiaries; and of the discipline in general, in those institutions, on the health of their inmates.” Without entering into an extended inquiry upon this important subject, the undersigned would simply present a few facts and conclusions, derived from the official records of the Eastern State Penitentiary and of the Moyamensing or County Prison, both located in the vicinity of Philadelphia.

These prisons, as is generally known, are conducted upon the plan of separate confinement, which originated in Pennsylvania, and

* See Letter of F. Graff, Esq., in Report of Committee on Public Hygiene, to Councils.

have been in operation for a sufficient length of time to enable us to arrive at important results as to the influence of this system upon health.

From the last Annual Report of the Eastern Penitentiary, we learn that since its opening in 1829, to the close of the year 1848, 2421 prisoners have been confined there, of whom 214 have died, being a mortality of nearly ten per cent.

In the County Prison, from its opening in Tenth mo. (October), 1835, to the close of the year 1848, 2818 prisoners were admitted to hard labour, of whom 155 have died, being an average mortality of 5.50. (*See Second Annual Report of Inspectors of Philadelphia County Prison, p. 21.*)

This disproportion between the two institutions is believed to be, in a great measure, attributable to the difference in the length of sentences of their inmates.

In the State Prison, persons convicted of the higher crimes are confined, their sentences varying from one to twenty-one years, and averaging at least three years; while in the County Prison, the period of confinement for less grave offences is much shorter, many being confined under six months, and a large majority not over a year. Thus, in the year 1848, of 160 prisoners sentenced to hard labour, 67 were sentenced for under six months, 40 over six months, 39 for one year and over, 11 for two years and over, and 3 for three years and over.

The mortality in both institutions is sufficiently high to excite anxious inquiry, and to create doubts as to the favourable influence of their discipline upon health. When it is remembered that the inmates of prisons are composed chiefly of young and middle-aged men, about three-fourths of the whole number being between twenty and forty years of age, and that prisons upon the separate plan are usually exempt from the epidemic and infectious disorders which prevail in crowded communities, this amount of mortality is the more striking.

It is estimated that in 1840, when the last census was taken, the deaths occurring in Philadelphia between the tenth and twentieth year, were only one in about 260 of the inhabitants at that period of life. Those between the twentieth and thirtieth years of age, were 1 in about 102; between the thirtieth and fiftieth years, 1 in about 57. This estimate includes the coloured population, whose general average of mortality, when taken separately, is

higher than the whites.* It would appear, therefore, that there is a wide difference between the deaths of the inmates of prisons and of persons of the same age out of prison. Allowance must be made, of course, for the vicious and irregular habits of convicts, and for their defective health on admission, but, even with this abatement, there is still a large mortality to be attributed to other causes.†

In examining into the circumstances which may be supposed to influence these results, several points present themselves as deserving of especial attention.

First. Prisoners in separate prisons, are confined both by day and night to small, illy-ventilated cells, which are shut out from the direct rays of the sun, and are consequently damp and gloomy. To these cells, yards are attached, in which the convicts are allowed to exercise an hour each day; but the walls enclosing these spaces are so high as to cut off a free circulation of air, and to prevent the access of the sunlight, except for a short time each day. To this cell and yard the prisoner is constantly restricted, and his trade or occupation is carried on in the same narrow apartment in which he eats and sleeps. He has, by this arrangement, no opportunity for exercise or employment in the open air, and is breathing, for the most part, a vitiated atmosphere, without the relief of a change of position and scene to a workshop, or of a walk to and from his daily labour.

Second. The occupations supposed to be best adapted to separate prisons are sedentary and unhealthy; weaving and shoemaking being the principal trades in these institutions.

Third. The length of sentences to which prisoners are subjected is a fruitful source of disease and death; and, in separate prisons, operates with more intensity than in the congregate prisons, in which the confinement is less rigid, and the occupations more healthful. Close confinement, which might be borne with impunity for six months or a year, becomes prejudicial when carried beyond this period; and if prolonged to four or five years, often breaks down the health of body and mind, if it does not destroy life.

Fourth. The most prominent cause of the large mortality in

* Emerson on Vital Statistics of Philadelphia, Amer. Journ. of Med. Sciences, July, 1848, p. 19.

† In 1846, there were 13 deaths, of whom 9 entered the institution in imperfect health; in 1847, 9 deaths, of whom 3 entered in imperfect health; in 1848, 16 deaths, of whom 11 entered in imperfect health.

the prisons of Philadelphia, is to be found in the intolerance of the coloured prisoners of this method of confinement, and their comparative good health under the milder system of associated labour. This peculiarity of the coloured race was noticed very soon after the opening of the Eastern State Penitentiary at Philadelphia, and was made the subject of an able paper by Dr. Benj. H. Coates, of this city, which was read before the American Philosophical Society, in the year 1843, and has since been published.

Ample experience since that time has confirmed the views then expressed by Dr. Coates, and the subject is now claiming renewed attention at the hands of the Prison Discipline Society of Philadelphia.

It appears that of the whole number of 1631 white prisoners received to the close of the year 1848, at the Eastern Penitentiary, 73 have died; and of the whole number of 790 coloured prisoners, 141 have died! (*See Note to Physician's Report, in Twentieth Annual Report, p. 1.*)

At the County Prison, a nearly equal disproportion exists. Of 1526 whites received to the close of the year 1848, 37 have died; while of 1392 blacks, admitted up to the same period, 118 have died! (*See Second Annual Report of the Inspectors of Philadelphia County Prison, made February, 1849.*)

The proportional mortality amongst the coloured population in the community at large, has been supposed by some to account for this wide difference in prisons; but this is found entirely inadequate to explain it.

The average mortality of the white inhabitants of Philadelphia during the decennial period from 1830 to 1840, has been estimated at 1 in 43; while the general average of the coloured population for the same period was 1 in 31, and in the year 1840 it was as low as 1 in 38½*.

It is proper to remark, that another cause for this increased mortality amongst the coloured prisoners, arises from the fact that the average length of their sentences for the same class of crimes is higher than that of the white prisoners; and that they seldom partake of executive clemency. Out of 278 pardons, granted since the opening of the Eastern State Penitentiary, but 25 have been bestowed upon this unfortunate class, notwithstanding the proportion which they bear to the whole number of inmates.

The causes above indicated predispose to the development of

* *See Emerson on Vital Statistics of Philadelphia, pp. 18 and 19.*

scrofula and consumption, and it is found that the large proportion of the deaths occurring in our prisons are from these diseases.

The development of insanity in penal institutions, with reference especially to the two systems of confinement known as the separate and congregate, is, at this time, exciting a deep interest both here and abroad. It is generally admitted that a larger ratio of insane to the sane, will be found in all prisons, than in the community at large; while many believe that there is a striking connection between insanity and crime, and a strong proclivity to the commission of outrages against the laws, even on the part of those hereditarily predisposed to mental disease. Some interesting inquiries upon this point have been made by Dr. Given, the present resident physician of the Eastern State Penitentiary, which will be found embodied in the seventeenth annual report from that institution.

It is believed by Dr. Given, that 9.09 per cent. of the prisoners committed there are insane to a greater or less degree, and that 20.20° of them have insane relatives bearing to them different degrees of consanguinity.

If this observation be true in reference to convicts generally, it is not surprising that there should be more insanity in a prison population than amongst other classes. The question for us to consider, however, is, *How far does the discipline of a prison tend to the development of the disease; or in what proportion of the convicts who enter with sound minds, is it induced?*

Upon this point, it is to be regretted that we are not furnished with the same accurate and detailed information as is contained in the admirable tables of physical health before referred to. We have tables, however, from both the prisons of Philadelphia, which present the actual amount of insanity occurring in each year in these institutions, and from the county prison a table showing all the cases which have been under treatment there, from the opening of the institution in 1835, to the close of the year 1848, with the age, sex, colour, date of sentence, period of attack, &c., of each patient. From this we learn that, in the county prison, twenty-three insane prisoners have been under treatment, out of 2,818 who have been in confinement. Of these, 14 are reported as having been insane on admission leaving but 9 cases originating in the prison.

We have no similar table from the Eastern State Penitentiary, but, by reference to the annual tables of insanity (which of late years have been very full and complete), we can ascertain the number re-

ported for any given period. With a view of presenting the present condition of that establishment, we will refer to the statistics for the past three years, as found in the eighteenth, nineteenth, and twentieth annual reports; premising that only the new cases, originating in the prison, are put down in these tables.

In 1846, 8 cases of insanity are reported, in a population of 308 prisoners in confinement at the close of the year. In 1847, 9 new cases are reported from 294 inmates, and in 1848, 10 cases from 292 inmates. All of these 27 cases are supposed to have been of *sound mind on admission*; 9 were ascertained to have had insane relatives in different degrees of consanguinity; from 7, no information could be obtained on this point, and in the other 11 no such tendency existed. 15 are recorded as entering the institution in good health, and 12 in imperfect health. •

The large disproportion here manifest between the two institutions, is probably attributable in a great measure to the same causes which influence the mortality, as before referred to, and also to the fact that the offences for which convicts are confined in the county prison, are of a less grave character, and not so likely to produce mental distress. Another cause may be, that the seclusion in the county prison is much less rigid than in the State institution, prisoners communicating with great ease, and being generally aware of what is going on around them.

It must be confessed, that the large amount of insanity and mortality revealed by the reports of both these institutions, has created in many candid and humane minds, strong doubts as to the safety of the discipline adopted therein. Many believe, however, that these results are not fairly attributable to the system of separate confinement, but that they might be greatly diminished by a more strict regard to hygienic laws, than has heretofore been observed. Such appears to be the opinion of the present efficient medical officer of the State Penitentiary; who thus expresses himself in his report for 1847.

“When speaking of the physical health, I stated my belief that, by proper sanitary regulations, the mortality could be reduced very greatly, without the slightest encroachment on the principles of separation; and now, as regards the mental health, I repeat the same conviction, with even greater confidence in its truth, and, if possible, a more earnest desire to see the necessary measures put in immediate operation.” And again, speaking of the insane prisoners in 1848, he remarks: “As regards those who become insane during their im-

prisonment, some efforts ought certainly to be made to have them placed under more suitable influences for their restoration to health, than has heretofore been the case."

Whatever may be thought of the practicability of the Pennsylvania system, and of the superiority of the principle upon which it is based in a moral point of view, it is evident that, unless the results which have thus far attended it can be altered by an administration more consonant with the laws of mental and physical health, this great experiment in penal discipline, for which Pennsylvania has become so distinguished, must fail of its humane purposes.

In the preceding sketch of the public hygiene of Philadelphia, your reporter has confined himself mainly to the topics suggested in the circular letter of the committee; he has aimed rather to point out defects and growing evils, than to bring to view the varied beauties and advantages, which have given to this city a high reputation, as one of the most healthful and attractive which is to be found in either hemisphere.

Should the labours of this and subsequent committees of the Association be instrumental in directing public attention to abuses in our large cities, and in bringing about salutary reforms, a noble work will have been accomplished; and we may reasonably cherish the hope, that these flourishing seats of intelligence, learning, and enterprise, will become also the abodes of health and salubrity.

In concluding this Report, the undersigned must acknowledge his obligations for the valuable aid furnished in its preparation by G. Washington Smith, Esq., and Dr. Emerson, both well known for the zeal and ability with which they have prosecuted inquiries into the subject of public hygiene, and to Charles A. Poulson, Esq., a member of the Common Council of Philadelphia, and Drs. Elkinton and Jewell, of the Board of Health, for their influence in obtaining prompt replies to the circular of the committee addressed to these bodies.

ISAAC PARRISH.

To Dr. JAMES WYNNE, *Chairman of Committee on Public Hygiene, of the National Medical Association.*

H.—6.

Public Hygiene of Massachusetts; but more particularly of the Cities of Boston and Lowell. By J. CURTIS, M. D.

THE Commonwealth of Massachusetts sustains a prominent position among the States of the Union in the adoption of measures for improving public health. For a long time, its statutes have provided for the registration of births, marriages, and deaths, occurring upon its territory. Its earlier systems, however, subsided into a state of comparative uselessness from their great inefficiency.

In 1842, the Massachusetts Medical Society, the American Academy of Arts and Sciences, and others, memorialized the legislature for a more perfect and operative law on this subject. These memorials resulted in the Act of March 3, 1842, which was superseded by the more effectual one of March 16, 1844. This last act was again revised and materially modified so as to augment its utility, in the act which passed yesterday (May 2, 1849). Yesterday, also, our General Court complied with the petitions of the State Medical Society, the American Statistical Association, and others, by passing a resolve which authorizes the governor to appoint three commissioners, to report to the next legislature a plan for a sanitary survey of the State. This is much in advance of anything that has before been done in this country.

In compliance with the registration laws, seven annual reports have been made by the Secretary of the Commonwealth.* These reports, though quite imperfect, from defective modes of registration in many parts of the State, have nevertheless presented much important information, especially the 2d and 4th, which were enriched with letters from Lemuel Shattuck, Esq., of Boston. Each year has made an advance towards accuracy and completeness of return, showing that the system is becoming better understood, and enlist-

* These annual reports embrace the twelve months ending on the 30th of April, in the year of their date. The city of Boston made no returns to the Secretary of the State, hence the county of Suffolk is not included.

ing an interest in proportion to the increasing knowledge of its great utility. During the last five years, nearly 80,000 births, 25,000 marriages, and 50,000 deaths, have been recorded. The record of deaths states the date, age, sex, disease, late residence and occupation. From such tables (a summary of which are appended to this Report), especially when they shall be nearer perfect under the late act, computations and comparisons of the highest value may be drawn with different localities in our own country, and other parts of the globe. The influences of climate, season, condition, placement, and occupation, upon human life, may be more or less clearly seen, as well as, also, topical influences upon particular diseases, and the proportional degree with which mortality presses upon different ages.

In the seaboard counties of the State, even after excluding Suffolk county, which embraces the city of Boston, the rate of mortality among children under five years of age, is four per cent. higher than in the western counties. In one of the interior counties (Franklin co.), in the valley of the Connecticut River, the average duration of life was thirty-eight years ten months and twenty-four days; while in the county of Middlesex, which includes the city of Lowell, it was only twenty-eight years two months and twenty-two days. A still greater difference obtains when we compare country districts with cities. In Franklin county, as before stated, the average age was nearly thirty-nine years, while in the city of Boston, it was a little less than 22.75 years, giving an addition of about 16.25 years, or over seventy per cent. in favour of the country district. Again, when we notice the condition of different classes, we find that, although the average age of all dying in Boston was only 22.75 years, the average age of those of them who were buried in the Catholic burying-grounds was but 13.5 years, or about one-third the average life in Franklin county.

In 1846, twenty-eight per cent. of all the deaths in the State were from diseases of the organs of respiration. The mortality from this class of diseases advanced, in 1847 and 1848, to near thirty per cent. Last year, of the 11,203 deaths recorded, 9954 were from specified causes; of these, 2937 were from lung diseases, most of which were consumption; 1202, or twelve per cent., were from typhus,* and 1074, or 10.8 per cent., from dysentery; making 52.3 per cent., or more than half of the total mortality of the State, from

* *Typhus* also embraces "*typhoid fever*."

these three causes alone. This shows that death has of late visited our people through consumption, typhus, and dysentery, much more frequently than through any other agents. The mortuary tables show that that most fruitful source of death—consumption—is much influenced by age, very little by season; while the congeners typhus and dysentery are affected both by age and season, as is exhibited by the subjoined abstracts. The period embraced is three years, viz., from 1846 to 1848 inclusive:—

TABLE I.

Ages.	Deaths from Consumption.				Deaths from Typhus Fever.				Deaths from Dysentery.			
	Males.	Females.	Total.	In 10,000.	Males.	Females.	Total.	In 10,000.	Males.	Females.	Total.	In 10,000.
Under 1	107	97	204	296	48	27	75	265	148	122	270	1681
1 to 2	71	51	122	177	54	33	87	308	198	143	341	2123
2 to 5	56	64	120	174	80	85	165	584	185	159	344	2142
5 to 10	47	69	116	169	87	96	183	647	65	49	114	710
10 to 20	190	539	729	1058	234	301	535	1893	37	41	78	486
20 to 30	564	1108	1672	2427	392	308	700	2477	37	57	94	585
30 to 40	446	727	1173	1703	200	157	357	1263	21	42	63	392
40 to 50	329	468	797	1157	91	95	186	658	28	42	70	436
50 to 60	248	352	600	871	90	86	176	623	32	40	72	448
60 to 70	268	325	593	861	70	74	144	510	21	30	51	318
70 to 80	233	367	500	726	77	55	130	460	20	38	58	361
80 to 90	62	90	152	221	22	19	41	145	11	20	31	193
Over 90	2	6	8	12	1	2	3	11	3	3	6	38
Unknown	46	56	102	148	22	22	44	156	8	6	14	87
Totals	2669	4219	6888	10,000	1466	1360	2826	10,000	814	792	1606	10,000

TABLE II.

Months.	Deaths from Consumption.				Deaths from Typhus Fever.				Deaths from Dysentery.			
	Males.	Females.	Total.	In 10,000.	Males.	Females.	Total.	In 10,000.	Males.	Females.	Total.	In 10,000.
May	210	360	570	828	65	53	118	417	7	3	10	62
June	213	331	544	790	98	73	171	605	6	9	15	93
July	239	322	561	814	112	82	194	686	60	63	123	766
August	224	367	591	858	152	154	306	1083	233	239	472	2939
September	241	376	617	896	231	219	450	1592	310	300	610	3798
October	208	369	577	838	225	205	430	1522	135	134	269	1675
November	203	313	516	749	158	144	302	1069	25	20	45	280
December	215	348	563	817	112	118	230	814	9	7	16	100
January	217	346	563	817	70	84	154	545	10	7	17	106
February	210	346	556	807	80	80	160	566	3	4	7	44
March	244	367	611	887	88	77	165	584	6	5	11	68 $\frac{1}{2}$
April	245	374	619	899	75	71	146	517	10	1	11	68 $\frac{1}{2}$
Totals	2669	4219	6888	10,000	1466	1360	2826	10,000	814	792	1606	10,000

The preceding tables show that consumption and typhus press upon the period between twenty and thirty with a force of mortality greater than at any other age; while more than one-half of the deaths from dysentery occur prior to the end of the fifth year of life. Again, we observe that typhus and dysentery, like other diseases of the zymotic* class, are by far the most fatal in the latter part of summer and early part of autumn, being the severest in September; while consumption exhibits much uniformity through the entire year.

Our life records are not sufficiently minute, to show how much the various occupations of life are influenced by the seasons; but the following table will serve to illustrate their effect on longevity, by exhibiting the average ages at death, in some of the more common pursuits, during the five years last past.

TABLE III.

Classes.	Number of deaths in						The average ages were in					
	1844.	1845.	1846.	1847.	1848.	1849.	1844.	1845.	1846.	1847.	1848.	1844 to 1848.
Agriculturists	663	645	679	741	739	3467	64.02	61.81	66.63	64.14	65.41	64.40
Labourers	182	219	216	262	424	1303	51.18	48.81	49.44	46.73	43.49	47.93
Mechanics	452	477	538	651	649	2767	45.63	46.96	45.75	46.45	46.06	46.17
Merchants	75	90	81	102	93	441	54.08	48.92	53.04	49.20	51.92	51.42
Paupers	35	5	37	47	32	156	70.91	81.60	69.48	57.62	65.00	68.92
Professional men	82	62	54	74	64	336	43.28	43.93	52.72	51.15	49.87	48.19
Public officers	25	35	34	42	45	181	40.68	44.11	41.06	45.00	40.04	42.18
Seamen	162	145	119	214	188	828	40.12	42.80	48.72	43.04	43.50	43.64
Totals	1676	1678	1758	2133	2234	9479	51.23	52.37	53.35	50.42	50.66	51.61

Since 1840, the subject of improving public health has been more or less agitated; and many writers have urged, with some effect, the claims of hygiene upon the citizens of the State. The excellent little treatise on the "Preservation of Health," by Prof. J. C. Warren, has passed through many editions, and had an extensive circulation. "The Factory System in its Hygienic Relations," being the annual address before the State Medical Society in 1844, by Dr. J. O. Green, has been perused by the profession with interest. The last annual address, before the same body, on "Ventilation," by Dr. L. V. Bell, is a very elaborate and valuable contribution. The well-timed lecture, before a benevolent fraternity in Boston, on the "Circumstances affecting Individual and Public Health," by Dr. C. E.

* *Zymotic*—epidemic, endemic, and contagious. See page 504.

Buckingham, contains many important topical facts, and ought to have a salutary influence. The works on "Physiology for Schools," by Drs. Cutter, Jarvis, and others, are effecting much good. But, without enumerating here all the useful publications on this subject, we would allude to the following, which deserves more than a passing notice. One of the most useful documents bearing on this point, is the very able Report of the Hon. Horace Mann, as Secretary of the Board of Education in 1843. At that time, of the 150,000 scholars in our public schools, only 416 were pursuing the study of human physiology; while 2,333 were studying the less important branch of algebra. The Hon. Secretary says: "The study of the laws of life and hygiene, or the rules and observances by which health can be preserved and promoted, has claims so superior to every other; and, at the same time, so little regarded or understood by the community, that I shall ask the indulgence of the board, while I endeavour to vindicate its title to the first rank in our schools, after the elementary branches;" and this he does in a very eloquent and convincing manner. Here he aims at a most important principle, that of teaching our children and youth those essential matters, which, if observed, will prevent much sickness, enlarge capacities for happiness and usefulness, and prolong life. When Catiline would subvert the liberties of Rome, he commences by corrupting the minds of its youth; so, also, the most efficient mode of working any great reform is to instruct, properly, the rising generation. The cardinal reason why the laws of health and life are so little regarded at present, is found in the great prevalence of an ignorance of them throughout the community, or, as the writer above quoted has it: "Sheer ignorance of facts and principles, which every parent, *by virtue of his parental relation*, is as much bound to know, as a judge is bound to know the civil or criminal law which he undertakes to administer; or a juror, in a case of life and death, is bound to understand the evidence on which his verdict is to be rendered." "Even educated men," he continues, "who are not physicians, are rare exceptions. The graduates of colleges and theological seminaries, who would be ashamed if they did not know that Alexander's horse was named Bucephalus, or had not read Middleton's octavo volume on the Greek Article, are often profoundly ignorant of the great laws which God has impressed on their physical frame, and which, under penalty of forfeiting life and usefulness, He has commanded them to know and obey." It is this that allows eminent divines, and others of high, general intelligence, to give their re-

commendations to vague nostrums, and lend their influence to vain pretenders, thus occupying a position where they cast a most baneful shadow upon the vital interests of their fellow-men.

Now, until knowledge on any subject, however practical or important, is disseminated, but little is to be expected; for, unfortunately, men seldom act as well as they know—never better. Knowing that a great change had taken place in the pursuit of life-knowledge in the State, within the last few years, and deeming something definite on the point highly desirable, I inquired of what will be universally acknowledged the best authority, and received the following reply:—

“WASHINGTON, April 12th, 1849.

“DR. J. CURTIS—

“*Dear Sir:* Your letter has just been forwarded to me at this place. The information to which you refer was obtained, in 1843, by inserting a question in the blank of the form of school return, which was sent to the committees.

“No such information has been obtained since. Of course, it is impossible to answer your question with precision. The number given must be conjectural. But a vast change has taken place in the public mind since that time, perhaps on no other subject a greater. All the teachers just out from our normal schools are well grounded in the elements of human physiology. They introduce it wherever they go. It has been prominent at all our teachers' institutes. I have lectured upon it hundreds of times to teachers and school associations. My estimate is, that not less than 15,000 of the 170,000 children in our public schools attend to this subject. But this, as I before said, is conjectural.

“Very truly, yours, &c.,

“HORACE MANN.”

It gives me great pleasure to comply with the strong request of Mr. Mann in another letter, by still urging increased attention to this most important subject, in the public schools of our commonwealth; for the sad results of violated physical law hereinafter to be noticed, are not so surprising to those who are aware of the general, almost universal lack of proper information.*

* “I will only add that, respecting the laws of health and life, it may be said—though the remark may seem so extraordinary as apparently to amount to a libel on human nature—on no other subject connected with the interests, happiness, or longevity of man,

Although something has been done in this State, when compared with other States in the confederacy, insomuch that those interested in sanitary improvement, both at home and abroad, have pointed to Massachusetts as having set an example worthy the imitation of her sister States, yet we are far, very far, in the rear of what we ought to be, when the great and vital importance of the subject is duly considered. We have legislated, *usque ad nauseam*, on almost everything but that which concerns us most, namely, the surest sources of health and life, and consequent happiness and prosperity. By legislation, we have protected the beasts of the field, the fowls of the air, and the fish of the sea; by legislation, we have encouraged the arts and sciences, except those which would most directly enable us to live long, useful, and happy; by legislation, we have granted privileges to the manufacturer, developed the resources of the agriculturist, and directly or indirectly offered rewards* for the best cattle, the fleetest horses, and the fattest hogs; have extended inducements for the best buildings, greatest crops, and most improved implements, all of which is most praiseworthy; but we have neglected to use the means for securing attainable longevity and exalted happiness as well as some of the most prolific sources of State wealth.

The CITY OF BOSTON kept a record of baptisms, marriages, and deaths for the seventy years immediately preceding the American Revolution, which is still extant. Since 1810, the superintendent of burials has kept a record of deaths. Abstracts of these bills of mortality have been printed by the city, and all but two or three of the earliest are still in existence. These statements, as annually made by the officer, since the date of the city charter in 1821, have been consulted, and the whole divided into quinquennial periods, the last being incomplete as to time, embracing only three years. The diseases have been classified according to the plan of Mr. Farr, the English Registrar-General, as modified by Mr. Shattuck, of Boston, and recommended by the American Medical Association, in 1847.

is the darkness of ignorance so profound and universal."—*Sanitary Condition of the Labouring Population of New York*. By JOHN H. GRISCOM, M. D. New York, 1845: pp. 58.

* The State has paid, through Agricultural Societies alone,

From 1792 to 1845	-	-	-	-	-	-	\$115,816 00
In 1846	-	-	-	-	-	-	3,440 00
In 1847	-	-	-	-	-	-	6,631 20
In 1848	-	-	-	-	-	-	7,102 00
Total	-	-	-	-	-	-	\$132,989 20

Mem. Mass. Med. Soc., House Doc., No. 66, 1849.

For the convenience of ready comparison, I have also calculated the per cent. which the mortality from each disease bears to the total from specific causes in each period.* Approaching accuracy in these records is manifested in the fact, that the unspecified causes of death have been reduced from 18.5 per cent. in the first period to less than one per cent. in the last period.

The statistics for the State embrace no period in the tables for Boston, unless it is the last; and typhus and dysentery have prevailed as epidemics so extensively in the State during the last year, as to preclude the propriety of considering the zymotics of this period a fair index of this class of diseases generally; hence, the justice of comparison between the State and its capital, in these diseases at least, is lost.

In 1818 and 1819, *typhus fever* proved quite fatal. It prevailed again in 1835, though not so severely. Since 1846, however, it has been one of the most fatal diseases in Boston. In the year 1847, it caused 673 deaths. *Dysentery* has also prevailed extensively, and been very fatal, not only in Boston, but throughout most parts of New England, during the last two years. The number of deaths in Boston from it was 222 in 1847, and 278 in 1848. It has never been above sixty-five in any year before since 1810. All "*diseases of the bowels*" have likewise very much increased of late. During the last three years, 1079 deaths have been recorded as having been caused by what it was intended to have this vague term express; 781 being the whole number recorded under this head for the thirty-five years previous, 123 of which were in 1845.

The *measles* appeared as a very fatal epidemic so long ago as 1713. In 1730 it was very extensive, but less fatal. It appeared again in 1757 and 1772. It has been much more frequent of late. In the period comprised in the tables, 1821, '25, '29, '32, '35, and '46 were the most fatal. In the last named year, it caused 150 deaths, and only fifteen and sixteen, respectively, in 1847 and '48.

Scarlet fever is said to have been first noticed in 1735 and '36, when it was quite general and very fatal throughout New England. It is stated that 4000 were sick with it in Boston, and one in thirty-five of them died. At this date, the town contained only 9000 inhabitants. In one of the neighbouring country towns, where nine

* We take the calculations for the period 1841 to 1845 inclusive (with some transpositions), as made out by Lemuel Shattuck, Esq., of Boston. We here also take pleasure in acknowledging our indebtedness to him for many important hints and points of information.

or ten was the usual annual number of deaths, it swelled the bills of mortality to 102, and an equal increase of deaths occurred in other places. We find but few deaths from the disease after this, till 1832, when it was quite fatal, as it also was in 1839, '42, and '44. Of late, it has attacked the younger members of some of the most healthy families in this city and in Lowell, and been very rapid in its progress, frequently terminating fatally in twenty-four or forty-eight hours.

The *small-pox*, so fatal previous to Jenner's discovery of vaccination, is on the increase. In 1836, the law which required all patients of this disease to be removed to the hospital, was repealed. During the last ten years, there have been 496 deaths from this disease in this city; there were but fifty-three for the thirty years previous. Within the last two weeks, our General Court have refused to revive the wholesome law that was repealed in 1836, although Boston has not been free from this loathsome disease since its repeal.

Boston was afflicted with epidemics of small-pox in 1649, 1666, 1678, and 1690. In 1698, Mather writes, "The small-pox has four times been a great plague among us."—"Often had one hundred bills, desiring prayers for the sick, been read in one day, in one of our assemblies. In one twelvemonth, about one thousand of our neighbours have been carried to their long home." In 1702, 4.4 per cent. of the inhabitants died with it. The most violent epidemic was in 1721, when 6006, being 54.6 per cent. of the population, had it; of whom 14.3 per cent. died. It was during the severity of the disease at this date, that the Rev. Dr. Mather called the attention of the faculty to an article on inoculation in a foreign journal. Dr. Boylston took the hint, and in opposition to the influence of his professional brethren, introduced inoculation into this country, commencing with his own son. Of those who were inoculated, one in forty-two died; of those who "took it in the natural way," as it was called, one in seven died. Notwithstanding these results, the opposition was so great that Dr. Boylston found it unsafe to leave his dwelling in the evening.* The prejudice appears to have been equally great in other countries.† The cry, sometimes heard at the present day in such cases,‡ was raised, that it was an impious interference with the judgments with which God was

* Blake's Biog. Dict. Chambers' Inform. for the People, *et alia.*

† See Lady Montagu's Letter from Adrianople, April, 1717, &c.

‡ See Prof. Simpson on Anæsthesia.

pleased to scourge his chosen people! The following table from Mr. Shattuck* furnishes a view of the prevalence and results of this disease during the eighteenth century:—

TABLE IV.

Years.	Cases.	Deaths.	Per cent. of pop.		Natural.			Inoculated.		
			Cases.	Deaths.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
1721	6006	850	54.6	7.7	5759	844	14.8	247	6	2.4
1730	4000	500	26.6	3.3	3600	488	13.5	400	12	3.0
1752	7669	569	48.9	3.6	5545	539	9.7	2124	30	1.4
1764	5646	170	36.4	1.1	669	124	18.5	4977	46	0.9
1776	5292	47	44.1	1.0	304	29	9.5	4988	18	0.5
1778	2243	71	16.6	0.4	122	42	34.4	2121	29	0.9
1792	8346	198	46.	1.0	232	33	14.2	8114	165	1.8

From Mr. Shattuck we also learn that the proportional mortality between the white and coloured population, during two epidemics, was as follows:—

TABLE V.

Natural.				Inoculated.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
1752.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
	Whites	5060	470	1985	24	1.2
Coloured	485	69	14.2	139	6	4.3
Total	5545	539	9.7	2124	30	1.4
1792.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
	Whites	214	27	8808	157	1.7
Coloured	18	6	33.3	348	7	2.0
Total	232	33	14.1	9152	164	1.8

Vaccination was introduced in 1799, after which, this repulsive disease was nearly annihilated until within the last ten years, when it has prevailed epidemically in 1840, and the winter of 1845-6.

Diseases of uncertain or general location have varied only 1.5 per cent. prior to 1840. Had the periods embraced ten years each, viz., 1821 to '30, 1831 to '40, and 1841 to '48, they would have stood 7.31, 7.50, and 7.56 per cent. respectively. Atrophy has considerably increased, while dropsy has decreased. "Sudden deaths" have also decreased, owing, no doubt, as in some other cases, to more accurate returns by physicians.

Diseases of the nervous system have maintained a higher per

* "Census of Boston," page 144.

cent. than the same class in the State. Those which more especially afflict children, as convulsions, hydrocephalus, &c., have generally increased.

The *organs of respiration* furnish a high ratio for a class of diseases no larger than this. The tables show increased accuracy in returns, and indicate that consumption has somewhat diminished. Tubercular diatheses, effected by the debilitating influences of city life, have, doubtless, sent off some to typhus and dysentery.

Diseases of the digestive organs have increased from 5.38 to 15.01 per cent. There is a great tendency to bowel complaints, both those of a zymotic and a sporadic character, among city inhabitants, especially the younger portion, and during the summer and autumn months.

Class V., and Classes VII. to X. inclusive, are quite small, and produce an aggregate of only 3.85, or an average of .77 per cent. of deaths.

I have ranked the indefinite terms "*infantile*" and "*old age*" together. Justifiable reasons for this, I think, will appear obvious to vital statists.

The *seasons* are acknowledged to exert great influence on health and mortality. By reference to Table XXVII., it will be seen that September was the most fatal month previous to 1840, and August since that time. This change has been quite gradual; and Mr. Shattuck has shown that the greatest number of deaths took place in October before 1820. He has also shown that the seasons do not affect all ages equally. We quote from him the annexed table, embracing five years, viz., 1841 to 1845 inclusive:—

TABLE VI.

Months.	Number of deaths.				In each 10,000 deaths, there were			
	Under 15	15 to 60	Over 60	Total.	Under 15	15 to 60	Over 60	Total.
January	433	292	96	826	421	280	92	793
February	431	315	84	830	414	302	80	796
March	373	306	87	766	358	294	83	735
April	421	322	100	843	404	309	96	809
May	425	330	101	856	408	316	97	821
June	356	291	82	729	341	279	79	699
July	475	296	75	846	456	285	71	812
August	698	335	64	1097	670	322	61	1053
September	671	327	88	1086	644	314	84	1042
October	449	339	77	865	431	325	74	830
November	377	351	80	808	362	337	76	775
December	429	337	104	870	412	323	100	835
Total	5543	3841	1038	10,422	5321	3686	993	10,000

"These deductions," he says, "show the interesting fact, that August, September, and October, which are most unhealthy to persons under 15 years of age, are the most healthy to those over 60; and that the winter months affect the health of old people most unfavourably; and that in the productive ages—15 to 60, the seasons have little or no influence in increasing or diminishing the number of deaths.

"If the published annual abstracts of the deaths had exhibited, as they should have done, the number of deaths by each disease, at each age, in each month, they would show, it is believed, that the principal increase of deaths in the unhealthy months is from diseases of the digestive organs, which prevail among children."

As we turn our attention to the *ages* at death, we approach a most interesting and important point in our investigations. It is a point which seldom receives merited examination, and to make it as clearly understood as its importance demands, would compel us to transcend the proper limits of this report. This, however, has been done to a considerable extent, and with much labour by Mr. Shattuck, the zealous advocate of hygiene, to the published results of whose investigations we must content ourselves to refer.*

The city of Boston contains not far from sixty-five miles of streets, and I learn, in a letter from C. B. Wells, Esq., the Superintendent of Sewers, that "The city has about twenty-five miles of common sewers under its control, varying from sixteen inches to five feet in the clear. Much complaint is made," he adds, "on the 'South Cove,' so called, of imperfect drainage, in consequence of the drains being constructed upon almost a dead level, and with no chance to remove the sediment which remains in the common sewer, and gradually fills it up. The same remarks will apply to certain sections of the southerly part of the city which drains the 'Back Bay,' so called." Here, then, we find only twenty-five miles of sewerage to sixty-five miles of streets, and even the sewers which do exist are very imperfect in their action, and becoming still more so from various causes. Mr. George H. Bailey, the Engineer to the Water Commissioners, informs me that, in laying pipe for water, in some places they have interfered very much with the sewers, occasionally so nearly obliterating them as to abridge their utility very essentially. In many places, also, in crossing streets, the water-pipes pass directly through the sewers only a few inches from their lowest part, thus assisting in the work of obstruction, not only by their own

* "Census of Boston," *et passim*.

presence, but also by staying substances on their tardy progress to the outlet. In answer to some inquiries, we received a letter from Dr. C. E. Buckingham, one of the physicians to the Boston Dispensary, from which we extract:—

“BOSTON, Dec. 7, 1848.

“MY DEAR SIR: The soil of Boston rests directly upon granite. The surface is mostly imposed matter, a very large portion of which is filled with organic substances in a state of partial decomposition. Much of the city is new land, built of mud from the flats, and refuse from the houses in the older parts.

“The city is but partially drained. Such parts as are in the best condition are partly furnished with brick sewers of a sufficient size. Many of these, however, at this time, are from one-half to two-thirds filled with mud. There are no real impediments to drainage in the older town; but much of the newer is so low, that the drains must be lower than high water mark; and there is no possibility of getting sufficient descent to flush them.*

“There is a Superintendent of Sewers, whose sole duty it is to oversee the building and cleansing of main sewers, drains, &c., but he is under the direction of the Board of Aldermen, who cannot be perfectly informed upon this subject, owing to the nature of their occupations. He is, of course, hampered by the want of power to flush and clear out at discretion. The city does not drain any alleys or streets that are less than thirty feet wide. There are many such, and they are drained or not, according as real estate owners see fit.

“The mode of street cleaning is by manual labour. The courts and alleys are, with few exceptions, occupied by the poor, and, generally speaking, are not cleaned even. The refuse from the houses (dry dirt) is placed in barrels, and taken away by the city carts to build new land with: such part of the remainder as is fit for pigs, is taken to the city stalls for that purpose. Almost all the houses are provided with privies into which chamber slops are thrown. There are some houses, however, unprovided with these buildings;

* In another place, Dr. B. remarks: “Speculation has built up houses and streets long before the new ground has become solid, and at such slight elevation, that waste water can run off only with the tide's fall; and, on its return, the water is, in some places, to be heard under the houses, and instances are not unknown where the water regularly comes up so as to be seen from the rooms below. I have seen the tide pouring into a back yard, from all four sides, to the depth of a foot; and have known men to sail around their kitchens in pursuit of their dinners, and coast along the shores of their cellars in tubs for their winter's wood!”—*Lecture on Individual and Public Health*, p. 19: Boston, 1848.

in such cases, as well as some others, excrement is thrown into the yard, and even under the lower floor of the houses. The dwellings of the poor are mostly filthy, often from neglect on the part of the occupants, as often from neglect on the part of the landlords, who get large rents, and do not provide suitable drains, privies, yards, &c.

“The number of families in a house varies with the number of rooms. I have found from six to forty or more in one house of two stories, eleven and more in one room constantly, and eight in one bed (men and women). This latter was in a physician’s house!

“The municipal regulations are far from effective. We need a health commissioner, who, in this matter, should be dictator, with power to order drains, privies, and fresh water where needed, and to turn out any excess of population from houses and streets.

“I have thus given you a very imperfect answer to your questions. My investigations of late have been less than I could wish; but every new visit shows me so much that is new and disgusting, that my knowledge of the city hygiene of a year since seems nothing.

“I remain, my dear sir,

“Very respectfully yours, &c.,

“CHAS. E. BUCKINGHAM.

“JOSIAH CURTIS, M. D.,

“*Lowell.*”

The subject of ventilation is scarcely regarded. No public buildings are adequately ventilated. Some of the public schools have been supplied with very imperfect ventilation, on an old plan recently revived by Mr. Emerson.*

The water commissioners state that, prior to March 9th, 1849, the sum of \$3,448,974 85 had been expended for the introduction of water. Their engineer informs me that fifty-eight miles of pipe (exclusive of service-pipe) have already been laid, and over 7500 buildings are now using Cochituate water. These pipes vary from four to thirty-six inches calibre. Here are provisions for the estimated want of about 7,000,000 gallons of water daily, to be impured

* The pride of Boston consists largely in its Latin school, twenty grammar schools, and 165 primary schools, employing 330 teachers, with an aggregate salary of \$167,550 75, annually. Of this, the amount above the demands of the law, which may be considered a voluntary contribution, exceeds the sum expended in the whole of Great Britain. It is a little strange that all this should be done, and some of the obvious principles of hygiene so little thought of.

by use and carried off by the scanty and ill-conditioned drains and sewers of the city.

LOWELL.—Scarce a quarter of a century has elapsed since the site of the present city of Lowell was a wilderness. What of importance it lacks in age, when compared with other places, is more than counterbalanced by the character and occupation of its inhabitants. If not the oldest, it is much the largest manufacturing community in our country.

The first factory here commenced operations in 1823; the second in 1825; two more commenced in 1828, &c. Lowell now has twelve large incorporated companies, which run about fifty mills, 310,000 spindles, 9359 looms; and employ near 10,000 females, over 4000 males; and possess a capital stock of \$12,110,000. Besides, there are many smaller companies.

By reference to Table XXXV., it will be noticed that our population possesses several important characteristics. First, it has increased very rapidly. This is owing to an influx from other places to meet the demand for labourers in our various manufacturing establishments. Secondly, it will be observed that a large preponderance, amounting to nearly two-thirds of our community, are females; and thirdly, that a larger proportion than in almost any other community—in the Atlantic States, at least—are embraced between the ages of ten and thirty. These characteristics are not altogether favourable to permanency of residence in our city, especially to those of somewhat feeble health, whose friends are mostly back in the country. If, in the census of 1830, we take the number 999, who were under ten years of age, and follow them in the census of 1840, they will be found between ten and twenty. But here are 4833, leaving an excess of 3834 between those ages who were not here in 1830, but since that time have taken up their residence here for a longer or shorter period, and were still here in 1840. Besides these, a very large number have sojourned among us for some time during the period bounded by the dates of the censuses, but had left before that period terminated. Again, there were 1587 in 1830, between the ages of ten and twenty, and in 1840 we find the number between twenty and thirty increased to 7711, showing that 6124 were added to this class during the same ten years; and here, as in the former case, just about seventy-five per cent. of this increment were females. When we advance another step, we discover a diminution instead of an augmentation to the

class. For the purpose of completeness on this point, the following abstract is given—the population of 1830 being placed ten years in advance:—

TABLE VII.

	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	Over 60	Total.
Males.							
1840	1,369	2,143	1,128	520	224	92	7,341
1830	495	405	958	358	111	58	2,392
Difference.	874	1,738	170	162	113	34	4,949
Females.							
1840	3,464	5,568	1,605	650	318	170	13,640
1830	504	1,182	1,792	353	164	86	4,085
Difference.	2,960	4,386	—187	297	154	84	9,555
Totals.							
1840	4,833	7,711	2,733	1,170	542	262	20,981
1830	999	1,587	2,750	711	275	144	6,477
Difference.	3,834	6,124	—17	459	267	118	14,504

It has been estimated, from somewhat extensive researches, that “the average time during which the female operatives work in the mills, is between four and five years;”* many observers, however, have placed the time considerably shorter. These peculiarities should be borne in mind, when our mortuary tables are compared with those of other localities.

The Rev. Mr. Allen states the number of deaths in the town of Chelmsford, of which Lowell was a part till 1826, to have been on an average of sixteen annually, for the seventy years previous to 1825.† There were forty-one deaths in 1825. No report was made in 1826. In fact, much obscurity envelopes the bills of mortality for the next succeeding ten years. The following table is the result of an examination of all reliable reports extant, previous to 1836:—

* “Lowell as it Was, and as it Is,” p. 194.

† Chelmsford, Phoenix, Jan. 6th, 1826.

TABLE VIII.

Months.	1827.	1829.	1830.	1831.	1832.	1833.	1834.	1835.
January	3	5	9	19	12			
February	3	4	5	7	11			
March	3	5	20	6	19			
April	7	8	11	8	14			
May	4	3	5	6	7			
June	2	3	4	7	14			
July	2	4	4	13	10			
August	9	5	6	12	22			
September	7	11	11	11	14			
October	8	3	11	10	12			
November	1	6	13	8	25			
December	1	5	15	17	24			
Unknown		4						
Total	50	66	114	124	184	223	225	236
Still-born included.	Unkn'n	Unkn'n	11	7	6			

The deaths in 1828 were stated by Dr. Elisha Bartlett, at the time, to have been thirty-two. "Among the 1500 females employed in the mills," he adds, "there did not occur, during the year, a single death."*

The bills of mortality since 1836, as returned by the Board of Health, and the superintendent of burials, have all been printed, and been filed in the city clerk's office; but they are very crude and meagre in point of important facts, though they are very accurate so far as they go. Indeed, Lowell is doubtless as *accurate* in mortuary records as any place in the country.† These abstracts, published by the city, have all been consulted with great care, and classified; and the ratio of mortality from each disease calculated in quinquennial periods, since the date of the city charter in 1836, forming Table XXXI., accompanying this report.

By reference to this table, we find that the causes of 5,718 of the 6,437 deaths that have occurred during the last thirteen years, have been stated. The deaths from causes not specified in the periods from 1836 to '40, 1841 to '45, and 1846 to '48, have been respectively, 245, 141, and 64; exhibiting increasing accuracy on this important point.

In consulting the tables, and examining the various causes of death, as classified, and comparing them with the similar tables for

* Lowell Courier, January 1829.

† "It is not pretended that the bills of mortality are absolutely correct; but the daily record of deaths is faithfully kept, and it is believed to be more accurate than that of any other city of its size in the country."—Report of City Physicians for 1848.

the State and the city of Boston, we discover some remarkable differences. The first which we notice is the higher proportional rate of mortality which obtains among epidemic, endemic, and contagious diseases, under the general term of *zymotics*. Says an earnest writer on public health, already frequently referred to, "It is the property of zymotic diseases to prevail more at one season than at another, or more in one locality than another; and to become epidemic, endemic, or contagious, under certain circumstances. The best index to public health," he justly observes, "may be deduced from the proportion in which these diseases prevail." The proportion which this class sustained to all the deaths from specified causes in the State during the last five years, and in the cities of Boston and Lowell, during the last eight years, was respectively, 27.98, 29.46, and 42.15 per cent. In Lowell, 20.66 per cent., or nearly one-half of these were from typhus and dysentery. In Boston, there has been no quinquennial period covered by the tables, when the per cent. of deaths from this class of diseases has been as high as thirty; while in our city, in no such period has it fallen as low as thirty-five. This, certainly, should arrest attention, and lead to an investigation of the causes of such results; and the causes should be removed; but, unfortunately, they are still at work, and on the increase! The following abstract exhibits a comparative view of deaths from zymotic diseases.

TABLE IX.

Places.	1836 to 1840.		1841 to 1845.		1846 to 1848.	
	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.
State	2,122		2,892		7,524	
Boston	555	26.51	658	28.36	3,147	29.96
Lowell		37.94		35.47	1,172	48.83

In Lowell, the deaths from different causes were as follows:—

TABLE X.

Classes.	Number of deaths			In each 10,000		
	1836 to '40	1841 to '45	1846 to '48	1836 to '40	1841 to '45	1846 to '48
Zymotics	555	658	1,172	3,794	3,547	4,883
Sporadics	719	980	1,005	4,918	5,284	4,188
Age and external causes	189	217	223	1,288	1,169	929
Total.	1,463	1,855	2,400	10,000	10,000	10,000

It is well known that from 1841 to 1845 inclusive, was a remarkably healthy period; and we accordingly find in it the lowest per cent. of deaths from zymotics. This corroborates the opinion just quoted from Mr. Shattuck, that the proportion of this class is generally a correct index to the health of any locality. The annual average of deaths during this period was less than 400. In the next and last-mentioned period, it was a little over 821.

Typhus, and dysentery, have prevailed as epidemics since 1846. The deaths from them were as follows:—

	1846.	1847.	1848.	Total.
Typhus,	103	147	72	322
Dysentery,	23	206	152	381

In the epidemic dysentery of 1847, about one in twelve of our population was sick with it; and not far from one in twelve of those who had it died. Of the deaths by this disease, July furnished 25; August, 93; September, 63, and October 15; other months, 10. *Croup* has gradually increased, and *scarlet fever* has decreased until quite lately, there having been no very extensive epidemic of this much dreaded malady.

Sporadics were the lowest in the last of the three periods. The first division, embracing those under the head of *uncertain* or *general location*, are characterized by much uniformity—deviating not far from 4 per cent. This is as might have been anticipated in accurate returns, as the laws which govern them are nearly constant.

Diseases of the nervous system have caused nearly one-twelfth of all the deaths. The most fatal of this class were hydrocephalus and convulsions among the young, and inflammation of the brain among adults. One death, ranked in this class, was from that frightful disease—hydrophobia.*

The fatality from diseases of the *respiratory organs*, claim for this class a rank next in importance to the zymotics. A little less than one-fourth of all the deaths have occurred from this class of diseases; and all but about one and a half per cent. of these were of consumption and inflammation of the lungs. In our climate, tubercular consumption proves most fatal among the agents of death. It insidiously encroaches upon the most delicate and interesting of the population. No class of our citizens, no sex or age, locality, or season, is exempt from its mortal ravages. It has been constantly

* The particulars of this case with autopsic observations, by "J. C." will be found in the *American Journal of the Medical Sciences*, Philadelphia, April, 1849.

among us, and every third day chronicles one of its unfortunate victims in our city!

The next class embraces the small family of diseases of the *organs of circulation*, which, though few in number, have somewhat increased.

Sporadics of the digestives embrace a large, but less important class of diseases than those zymotics which involve these organs. Inflammations of the stomach and bowels have proved most fatal with adults, and teething with children.

The organs of urination are subject to but few diseases, as also those devoted to the propagation of our kind, and the latter have decreased in fatal affections. Diseases of the bones, muscles, and skin, comprise the next two classes, and their number is very small. Many otherwise undefined causes of death in the extremes of life—the infant and the antiquated—have next been classed together. Nearly nine-tenths of this class were removed by death in early life.

The heterogeneous group under the class of external causes have been gradually decreasing. Fatal accidents in various ways are not unfrequent in a place like Lowell; and, it is not surprising that these should have somewhat increased.

The number of deaths from each sex will be found in Table XXXII. In each year, with the single exception of 1841, has the mortality of females exceeded that of males; but the proportion of the deaths among females to the living of that sex, has been less than the analogous ratio among males. In the years when the censuses were taken, the following proportions to the living existed:—

TABLE XI.

	1836.			1840.			1844.			1846.		
	Males.	Females.	Total.									
Population	6345	11,288	17,643	7341	13,640	20,981	9432	15,697	25,129	29,127		
Deaths	113	140	253	186	199	407*	163	196	362*	690		
1 death in	56.16	80.63	69.70	39.47	68.20	51.55	57.93	80.87	69.00	42.21		
In 100	1.79	1.23	1.43	2.53	1.47	1.94	1.73	1.24	1.44	2.37		

The above table shows the remarkable result, that, among the male population in the years of 1836, '40, and '44, there died one

* In the total of deaths for 1840, there are 22 whose sex was not stated. In the year 1844, there were also 3 whose sex was not stated.

in 56, 39.5, and 58: while among the other sex, in those years, the deaths were one in 81, 68, and 81 respectively.

Lest these isolated years, for some cause, should not prove a fair index, in their unexpected results, I have calculated the average population for the periods from 1836 to 1840, and from 1841 to 1845. Also, the average number of deaths for the same periods, and deduced therefrom the following results:—

TABLE XII.

	1836 to 1840.			1841 to 1845.		
	Males.	Females.	Total.	Males.	Females.	Total.
Population	6,843	12,464	19,307	10,329	18,814	29,143
Deaths	159.8	177.4	341.6	186.4	209.0	399.2
One death in	42.83	70.26	56.52	55.31	90.19	73.03
In 100	2.332	1.423	1.804	1.808	1.108	1.369

These figures corroborate the results in the former table, and substantiate the general truth that, in Lowell, the agents of death press with much greater force on the male than on the female sex. One reason for this, doubtless, arises from the fact that so large a portion of our female population are sojourners here for a few years, and when they discover declining health, they retire to their homes in the interior country towns, to enjoy the invigorating and recuperative influences which are not found in a dense city, or to spend their final days among kindred and friends.

It is conceded that the *seasons* exert much influence on health and life, especially in cities. Table XXXVII. will exhibit the range of the temperature of the air, and show some of our climatal changes.

By consulting Table XXXIII. in the proportional mortality for the months, June will be found to have been the most healthy month in the aggregate, while August has universally been the most fatal. The seasons appear thus, for the thirteen years from 1836 to 1848 inclusive:—

	No. of deaths.	In 10,000
January, February, March	1245	2056
April, May, June	1252	2034
July, August, September	2271	3616
October, November, December,	1400	2294
Total	6168	10,000

This shows the summer months to have been by far the most fatal; although, at this season, large numbers of our citizens resort to the country for comfort or health. This is the time, too, when many a loom is silent, and many a spindle still—the operatives embracing this sickly season to be released from their labours, and enjoy a visit at their rural homes. Notwithstanding all this, there is a much greater difference in the health of Lowell at different seasons, than there is in the health of Boston. Of the deaths in Boston, from 1821 to 1848 inclusive, the months of

January, February, and March furnished	23.14	per cent.
April, May, and June	22.19	"
July, August, and September	28.64	"
October, November, and Dec'r	26.03	"
	100.00	

The difference between the highest and lowest rate as above, is only 6.45 per cent., while the difference between the highest and lowest in Lowell is 15.82 per cent. In Boston, it was shown (Table VI. p. 497) that the high rate of mortality in that city during the summer season fell almost entirely on the younger part of the community. In 1845, 22.5 per cent. of their population were under ten years of age, and in 1844 only 19.2 per cent. of our population were under that age. Now, had we the necessary data at our command, it would be exceedingly interesting to ascertain if all of the greatly increased rate of mortality during the summer, in Lowell, was inflicted upon the diminished proportional number of the young; but, unfortunately, we have not the means.

The ages at death furnish a point of great importance in our investigations, as has been already remarked. The first thing we notice in Table XXXIV. is the high per cent. of deaths in early life. More than one-fifth of all the persons who have died in Lowell since 1836, were under one year old; and nearly one-half were under five. In the State, during the last five years, those who met death before they had lived five years, constituted 34.06 per cent. of all deaths. In Boston, during the last quarter of a century, the per cent. was 42.26; and in Lowell, during the last thirteen years, it was 46.46. This confirms the universally received opinion that cities are peculiarly unfavourable to viability; and gives definiteness to the fact. The philanthropic inquiry arises, cannot some means be put into operation which will avert, at least a part of this heavy fatal force which is pressing upon those of tender age in city communities? If, as Jefferson stated, "great cities are great sores on

the body politic," in a political sense, they are not less so in a physical sense. After the age of ten, the Tables seem to indicate that the proportion diminishes till we arrive at the age of twenty, when it takes a sudden rise during the succeeding decennial period, from which it falls *gradatim* to extreme senility. Before deciding, however, at what age individuals are most liable to die, we must introduce another element of information. Let us institute another mode of inquiry, by comparing the deaths at different ages with the living at the same ages. The subjoined tables will show this.

TABLE XIII.

	Under 10	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	Over 60	Total.
Average population, 1836 to 1840	3369	4469	7300	2497	1009	454	209	19,307
Average deaths	175.2	37.4	50.6	31.4	19.0	14.4	12.0	341.6
Being 1 death in In 100	19.23	119.49	144.27	79.53	53.10	31.53	17.42	56.52
	5.200	.837	.693	1.258	1.883	3.172	5.741	1.804
Av. population, 1841 to 1845	5181	6713	10,711	3796	1625	753	364	29,143
Av. deaths .	211.2	37.0	55.6	39.8	21.6	15.2	16.4	399.2
Being 1 death in In 100	24.53	181.43	292.64	95.38	75.23	49.54	22.20	73.03
	4.077	.529	.342	1.048	1.329	2.018	4.504	1.369

These calculations show the probabilities of living to be the greatest at the period of life between twenty and thirty; and the next greatest between ten and twenty; then they follow between forty and fifty; fifty and sixty; under ten, and the least over sixty. In the city of Boston, we find similar results; the greatest probabilities of living, however, are one decade earlier. They run thus: Greatest probabilities of surviving the present period, between ten and twenty; the next greatest between five and ten; they then follow, between twenty and thirty; thirty and forty; forty and fifty; fifty and sixty; sixty and seventy; under five; between seventy and eighty; eighty and ninety; and the least over ninety. In that city, there has been a gradual and constant proportional increase of mortality among children under five years of age. The deductions for Lowell, from 1841 to 1845, it will be observed, are more favourable in all ages than those during the next preceding quinquennial period. But it has already been shown that the former was a very healthy period. The results of our investigations on other points warrant us in the statement that, had we the necessary data to examine and compare the mortuary bills for the three years last past, we should find in them the rate of mortality considerably

advanced. It is to be regretted that no means exist, by which we can ascertain, even with any reliable approximate accuracy, what the results would show.

The following table will exhibit the force with which some of the most fatal diseases have pressed upon different ages as well as sexes, during the last three years.

TABLE XIV.

	Con- sump- tion.	Dysen- tery.	Typhus.	Hydro- cephalus.	Croup.	Cholera Infant.	Teeth- ing.	Infan- tile.	Totals.
Males.	137	166	146	52	43	68	13	92	722
Females.	218	215	176	53	38	59	14	39	812
Total.	355	381	322	105	86	127	27	131	1534
Under 1	6	41		35	17	78	13	131	321
1 to 2	8	82	4	35	19	41	14		203
2 to 5	7	78	15	20	42	8			170
5 to 10	5	27	15	8	8				63
10 to 20	54	33	89	4					180
20 to 30	114	49	128	2					293
30 to 40	64	21	30	1					116
40 to 50	44	16	24						84
50 to 60	25	12	11						48
60 to 70	21	13	5						39
Over 70	7	9	1						17
Total.	355	381	322	105	86	127	27	131	1534

The city of Lowell presents a very extensive field, by embracing the subject of manufacturing, as it influences health. This topic, however, is not sufficiently limited to receive a full investigation in our brief remarks. It must satisfy our present purpose, therefore, to allude to some of its more prominent features.

A subject of so grave a character, has not remained to the present day without discussion. Unfortunately for the true merits of the question, however, it has hitherto been handled principally by politicians and partialists. Antagonistic parties have made statements and counter-statements, and too often, such only as would best make capital in favouring the views of each. It is a most important subject, and should be approached, even for brief statements, with the utmost candour and strictest impartiality. There appears generally, not only a willingness, but a desire, on the part of the high-minded and humane gentlemen who have the charge of these manufacturing establishments, to have the matter fairly treated and the exact truth made known. The general public feel equally interested and anxious to obtain unbiased facts.

So many elements of information, and these of such a nature, are called into requisition, that, to give it the critical and plenary consideration it so richly merits, would be to surmount insuperable difficulties. Some of these obstacles will manifest themselves as we progress.

Our population now numbers not far from 33,000. Near one-half of these are directly connected with manufacturing, of whom three-fourths or four-fifths, are probably employed by the twelve principal corporations. These twelve companies manufacture annually, some hundred million yards of cotton; one million one hundred and fifty thousand yards of woollen; and three hundred and fifty thousand yards of carpeting. They also print some twenty million yards of calico; bleach four millions five hundred thousand pounds; and dye one million five hundred thousand yards. This requires some thirty-five millions of pounds of cotton; and two millions four hundred thousand pounds of wool. They consume twenty-five thousand five hundred tons of anthracite coal; thirty-six thousand five hundred bushels of charcoal; eighty thousand gallons of oil, and thirty-five thousand of lard. The amount of wages paid monthly is over two hundred thousand dollars, or near two millions five hundred thousand dollars per annum. The mills are all warmed by steam, and run the same hours, as follows:—

TABLE XV.

Months.	H.	M.	Months.	H.	M.	Months.	H.	M.	Months.	H.	M.
January,	11	09	April,	13	16	July,	12	30	October,	11	55
February,	11	45	May,	12	30	August,	12	30	November,	11	41
March,	11	37	June,	12	30	September,	12	08	December,	11	09

Daily average for the year, twelve hours and thirty-three minutes.*

Let us now confine our attention to a single corporation, and *ex uno disce omnes*. The Merrimack is the oldest in Lowell, the largest, and probably as favourable a specimen of cotton manufactories, as can be selected in New England. This establishment has extended every desired facility to me for accurate investigation. They employ between 1300 and 1400 females, and about 350 males, whose aggregate wages vary but a trifle from \$1000 per diem, at the present

* Twelve hours and thirty-three minutes embrace the average time of *running the mills*. Many of the operatives are not actually at work all this time. The mills ran an average of twelve hours and forty-eight minutes, prior to May 1st, 1847.

time; previous to the reduction of wages in November last, it amounted to \$1,200 per diem. I take the following abstracts from their books, covering the last nine years.

TABLE XVI.

Female Operatives.

Years.	Whole number employed.						Whole number left.						Average No. of months they remain on this Corporation.	
	Monthly average.	Maximum.		Minimum.		Monthly average.	Maximum.		Minimum.		Month.	No.		
		Month	No.	Month.	No.		Month.	No.	Month.	No.				
1840	1355	June	1511	Oct.	1191	175	Aug.	265	Jan.	96	7.74			
1841	1343	May	1465	Sept.	1223	152	Aug.	245	Jan.	93	8.84			
1842	1330	Jan.	1359	Sept.	1277	152	Aug.	240	April	92	8.75			
1843	1277	Jan.	1304	Aug.	1166	139	July	205	Feb.	89	8.12			
1844	1261	June	1356	Jan.	1226	125	Sept.	186	March	66	10.09			
1845	1255	June	1362	March	1201	132	Sept.	213	Jan.	68	9.51			
1846	1248	May	1442	Jan.	1217	121	Aug.	197	March	69	10.31			
1847	1264	May	1367	Sept.	1121	141	Aug.	241	Dec.	87	8.96			
1848	1438	Oct.	1741	Jan.	1205	175	Oct.	248	Feb.	62	8.21			
Annual averages.	1308					146						8.95		

Male Operatives.

Years.	Monthly average.	Maximum.		Minimum.		Number of yards manufactured.
		Months.	No.	Months.	No.	
1840	224	October	245	January	205	12,254,236
1841	259	July	308	January	226	12,495,393
1842	232	July	257	February	212	12,681,697
1843	217	October	240	March	187	12,064,690
1844	218	September	232	March	210	12,808,424
1845	296	September	444	January	196	13,313,594
1846	443	August	622	January	276	13,024,020
1847	387	May	455	March	314	12,918,921
1848	347	September	369	February	317	15,382,103
Annual averages.	287					12,993,792

This company has five mills,* each having five halls or rooms, 151.7 feet long, 40.6 feet wide, and 10.5 feet high, giving 64,670 cubic feet to a room. They own 178 houses, 35 of which are devoted to female boarders, and 10 to males; the remainder are occupied as tenements by the families of the married men among their

* A sixth mill, of larger dimensions, has recently gone into operation; but the number of persons to work in it is correspondingly increased. In essential hygienic particulars, therefore, it does not differ from the others.

employed. A part of these boarding-houses have been recently constructed, and are a superior class of buildings. Forty-five minutes are allowed for their meals, during which time they put on their extra clothing, go a few hundred yards to their boarding-houses, eat, and return to their work. During the six months intervening July 24th, 1848, and January 24th, 1849, among the 1438 female operatives, 68 were known to be sick so as to require medical attendance, 4 of whom, or 1 in 17 died. During the same period about 490 deaths occurred in the whole city. The attacks of sickness were, in July, 5; in August, 23; in September, 11; in October, 12; in November, 3; in December, 9; and in January, 4. The deaths were in August, 2; in September, 2.

The above data, as far as they go, very fairly indicate the hygienic state of cotton factories in Lowell, and present points worthy of notice. In the first place, we perceive the instability of our operative population. While there are a very few who have remained some twelve or fifteen years or more, the average length of time of remaining on the Merrimack corporation for the last nine years, has been only nine months.* It is believed, that the entire population of other corporations changes a little oftener than this. Some go from one corporation to another in the city, to do the same or some other kind of work; some to other manufacturing places; some, either temporarily or permanently, return to their country homes; and some—are married. The causes are still more varied than the nature of these changes. We are not able to say how many leave on account of ill health, nor how many of these become ill while connected with the mills, nor how many of these can trace the cause of declining health to influences concomitant with their employment.† The very fact of their having exchanged the salubrious breezes which sweep the hills and valleys of country districts for a city

“Sated with exhalations rank and fell,
Which rouse the heart to every fever’s rage,”

has some influence, and should be taken into the account, as well as the various places of evening amusements and candy-shops, which tempt the unwary. The accidentals should not be confounded with

* Due allowance should be made for those who make a temporary visit of but a few weeks among their friends, and then return.

† In May, 1845, the following questions among others, were put to 1424 girls while at work, in eight different mills on as many different corporations: “Do you enjoy better health than before working in the mill? Do you enjoy as good health? Do you not

the essentials of factory life. Generally speaking, their labour is light, but constant. Their hours of labour, and rest, and meals are regular, and this is highly conducive to health. *Nature loves regularity as it abhors a vacuum.*

It has been said, that "the rooms in which they work are kept of a uniform temperature, and are lofty and well ventilated."* It will be seen in Table XVI. page 512, that on the Merrimack Corporation (and this is supposed to be a fair specimen) there has been an average of about 1600 males and females. We will make a liberal deduction, and assume 1350 only, as actually in the mills, and 250 employed in other places about the works. This gives 270 for each mill, and 55 for each room, containing only 64,670 cubic feet, inclusive of the space occupied by machinery. Some rooms have more operatives in them than others, and there are more at some seasons than at others, but we have taken the average. Here, then, we find a certain number for a definite time in a limited space, without any ventilation whatever, except that of an accidental nature, at the doors of entrance in winter, and the same with open windows in summer, and this, too, with the thermometer ranging from 65° to 85° through the winter months! This certainly demands attention, and calls loudly for reform. From the character and variety of the ailments that solicit relief at the hands of our profession in Lowell, we look upon this topic as the most prolific source of deteriorated health in the adjuncts of factory labor among us, and in our neighboring manufacturing towns. Happily, this is an evil which admits of a remedy, and, though hitherto almost, or quite totally neglected, we cannot but look, with high confidence,

enjoy so good health?" Just four years before, in 1841, similar queries were made of 2611 girls. The results were as follows:—

1841.		1845.	
	No.	Per cent.	No.
Health better	170	6.51	154
Health as good	1563	59.87	827
Health not so good	878	33.62	443
Whole number interrogated	2611	100.00	1424
			100.00

See "Lowell as it Was, and as it Is," pp. 164, *et seq.* By Rev. H. A. Miles, 1845; and "Vindication of the Character and Condition of the Females employed in the Lowell Mills," p. 11. By Elisha Bartlett, M. D., 1841.

* "The Factory System in its Hygienic Relations," by J. O. Green, M. D., M. M., S. S.

for a great change in this particular, when it becomes a little better understood. "In the cotton mills, ventilation is very sparingly introduced, whereas, it ought to be most abundant in a place kept at an elevated temperature. The additional quantity of fuel this degree of ventilation (in the cold season) would require, cannot be withheld by any person endowed with either honesty or humanity. Pure and wholesome air is as necessary to the well-being of man, as pure and wholesome food; and he that would knowingly compel his work-people to live in an impure atmosphere, is equally as criminal as the adulterator of bread."* An able writer† in our neighbourhood recently said: "A few men of giant energies, of boundless faith, of far-seeing calculation, sit down in the counting-rooms of this city [Boston] with a surveyor's sketch and a few engineer's levels. They decide that a town shall be built—a manufacturing city erected. Straightway, and almost like the falling, opening, raising, changing scenes of the theatre, huge brick palaces arise, streets in long perspective of shops, schools, houses, sidewalks, begin to stretch themselves out from a thousand nuclei, to meet the new-formed elements in exact symmetry, like the points of ossification in the growing embryo. Churches point their spires to the skies, in all the beauty of Gothic tracery, or plant their firm columns of stone in all the solidity of Grecian art. In short, what the conquerors of the world have been lives and centuries in designing and accomplishing, is called into existence by our merchant princes, almost with the wave of Prospero's wand!"

Would that the same prophetic and far-seeing vision, which pierces so clearly into the distant future as to warrant these unbounded outlays; which boldly cuts down hills and fills up valleys to accommodate the hundred thousand inhabitants, presenting themselves in the misty future, while the grass is still green in the projected avenues—would that it could, at the same time, foresee and prevent, the disease, the death, the misery; the moral, social, as well as political ills, which appear, upon the best of evidence, to go hand in hand with plain sanitary precautions—and realize the illustrations unnumbered from experience past, which tell, with demonstrative certainty, that moral and social degradation are indissolubly linked with disobedience of nature's laws.

* *Principles of Warming and Ventilating Public Buildings, Manufactories, &c.,* by T. Tredgold, London, 1836; Art. Cotton Mills, pages 173, 4.

† L. V. Bell, M. D., L. L. D.

I blame not these founders of cities, that they have paid but little regard to hygienic and sanitary measures. It is glory enough to build cities—it is too much to expect the same minds which can grasp all the elements essential to these great undertakings, in a commercial point of view, should comprehend all the mysteries of typhus, struma, or contagion, and the relation of these to ventilation, sewerage, and water supply. It is for our profession to step in at this point, and to guard the rights of generations yet unborn, in these respects; and the wise interest, the sagacious foresight, the honourable ambition for unmixed success, will guarantee the co-operation of the builders of cities, whenever they are convinced of the reality of the evils, and that they are susceptible of prevention and relief.

The “ghastly bills of mortality,” as they have been termed by an English statistician (under some overlooked or mistaken modifying circumstances, perhaps), “of one of our new cities [Lowell], the prevailing impression of the unhealthfulness already of our lately populated manufacturing towns, call aloud to the medical profession to look at the growing evils of hygienic neglect, full in the face, and if they require a plenary and decided remedy, however costly, it will not be long in being found.”

“The very fact,” says the same eloquent writer, “that a half of the machinery of the human body, measured either by its capacity or its complexity, is devoted to the function of ventilating the blood, by processes essentially mechanical and chemical, demonstrates the rôle which the air plays in the support of life, and can hardly be over estimated.” The amount of air received at each inspiration, has been variously estimated,* and differs in different individuals at different seasons, times of the day, &c. We respire at least a thousand times each hour, and deoxygenize a volume of air equal to five times the amount of oxygen required in the animal economy. This is but a single source of atmospheric vitiation. Besides the polluting

* The number of cubic inches of air taken into an ordinary pair of lungs at each inspiration, has been estimated by different experimenters as follows: Abildgaard, 3; Murzer and Lametherie, 8 to 10; Keutsch, 6 to 12; Abernethy, 12; Goodwin, 3 to 14; Lavoisier and Seguin, 13; Hutchinson, 7 to 17; Sir H. Davy, 13 to 17; Allen and Pepys, 16.5; Kite, 17; Herbert, 16 to 25; Jurin, 20; Herdolt, 25 to 29; Barelle, 15 to 40; Dalton, 30; Fontana, 35; Richerand, Folland, Gordon, and Cavallo, 30 to 40; Hales, Suvages, Haller, Ellis, Soëmmering, Thompson, Sperengel, Bostock, Bell, Monro, Blumenbach, 40; Menzies, 42 to 46; Reil, 42 to 100.

exhalations from our entire superficies,* we generate by the lungs a poisonous compound equal to the loss of oxygen.

The volume of pure air to be supplied to each person has also been estimated.† This, too, varies in different circumstances. If we assume ten cubic feet each minute to each person, as the proper standard, and this is the minimum of the more recent investigations, we find the fifty-five operatives in a room requiring 550 cubic feet per minute, 33,000 per hour, and not less than 450,000 during each day's period of labour; whereas we have shown that they have but about 60,000, making some abatement for space occupied by machinery! In winter, moreover, for four months, when the windows are closed and generally double, each room has fifty solar lamps burning morning and evening, which assist not only in impurifying the confined air, but also in raising the temperature frequently to 90° F. before closing work at night. In all kinds of weather, the operatives, with a hastily adjusted dress, emerge from this atmosphere to their boarding places, partake of a plain but substantial dinner, and return to resume their labour in the space of forty-five minutes.

The air in these rooms, which ought to undergo an entire change hourly, remains day after day, and even month after month, with only the precarious change which open doors occasionally give! There being no ventilation at night, the imprisoned condition of many of the rooms in the morning is stifling and almost intolerable to unaccustomed lungs. After the day's work is ended, two hours' release is enjoyed, a part of which is frequently spent in a crowded lecture-room, and then they retire to dormitories scarcely better ventilated than the mills. From four to six and sometimes even eight are confined during the night in a single room of moderate dimensions. It is but just to say, that this remark will apply with more force to other corporations throughout the city, than to the Merrimack at the present time. The condition of these sleeping apartments probably would not be endured so passively, did not their occupants first become habituated to unwholesome air in the

* Estimated at an average of 32 ounces every 24 hours.

† Dr. Arnott considers 2 or 3 cubic feet per minute, as all that need be furnished each person; Mr. Tredgold fixes his average at 4 cubic feet per minute; Mr. Hood, 3.5 to 5; Mr. Toynbee, F. R. S., 10. Dr. Reid, ventilator of the new House of Parliament, says that 10 cubic feet to each person proved to be a minimum which was generally recognized as below the natural wants of the system, and declares his determination to introduce not less than from 20 to 60 cubic feet per minute. In the late French Chamber of Peers, 12 cubic feet were furnished; at the Pentonville Model Prison, there are arrangements for supplying from 30 to 45 cubic feet. Dr. L. V. Bell considers from 10 to 20 cubic feet as not, perhaps, an unsafe estimate.

mill. In the latter, efficient ventilation might be economically furnished by appropriating a modicum of power to that purpose.

It has been supposed that the motion of the machinery, in some degree, affords a substitute for ventilation; but it only agitates the confined air, and thus assists in the chemical admixture of the noxious gases and the mechanical suspension of the dust particles and flue, thus proving a positive injury, so far as it is to be taken into the account. Who can calculate the amount of injury which such a fluid, thus freighted, has upon the estimated 20,000 square inches of membranous surface investing the delicately constructed air-passages, and the 1,744,000,000 of infinitesimal air-cells, in an ordinary pair of lungs, and through the medium of the blood, upon the general system? Is this alone not enough to cause those debilities which give insipid pallor to countenances to which we naturally look for something interesting? Is it not enough to develope some of the protean forms of scrofula or other insidious diseases in the predisposed, and to deteriorate general health and produce menstrual and other derangements?* The machinery in humanly organized beings can no more move with vigor and health, with a scanty supply of pure air, than the less complex machinery of the mills can move, with strength and efficiency, with a deficiency of water. The laws of nature are as precise and imperative in the one case as in the other. The blood has just the admixture of the proper components requisite, and the atmosphere has the definite proportions of the specific elements; both are in contact with the proper intervening septum to accomplish the necessary object in the best possible manner. Any variation must be a defect—a permanent deviation must be an irreparable injury.

That we may not too far transcend our limits, we must omit many other important considerations incident to cotton manufactories, besides bleaching, dyeing, calico printing, &c.† The summation of

* Vitiated air is also the proper *pabulum* for zymotics, whether in the stenchdoms of the filthy, the emigrant ship, or the cotton mill. Its effects "are strikingly illustrated in an account given by Dr. N. Fanning, of Gilboa, N. Y., of a fever that made its appearance in that village during the last winter. Of 123 operatives employed in a cotton mill, it appears that, in the course of two months, nearly one-fourth were seized with typhoid fever. And, from the history of the disease, which is given with remarkable precision and clearness, there can be very little doubt that its origin may be justly traced to a gross neglect with regard to ventilation."

† M. Villermé, of France, has made many interesting investigations on some of these points.

our investigations (united with some personal observations for a number of years in Lowell), respecting the hygiene of our manufacturing population, as affected by the essentials of their employment, is embodied in the following conclusions.

1. The peculiarity of Lowell, as embracing the leading manufacturing community in America, renders the investigations of health and longevity among us, worthy the most impartial and anxious scrutiny.

2. The fluctuating character of our operative population renders it exceedingly difficult to arrive at accuracy in points of public health among them.

3. The limited investigations hitherto adopted can furnish no correct idea of their comparative health, nor of the comparative health of Lowell.

4. Though many points demand attention, yet, to imperfect ventilation, or rather to an absence of ventilation, more than to any other one cause, can we trace the origin of impaired health.

5. The operatives are more comfortable and healthy than several other classes of our citizens; and as healthy, perhaps, as the aggregate of all other classes.

6. Much might be done at a trifling cost, compared with the value of results, to elevate their physical condition; and it is earnestly hoped that some hygienic changes will be adopted.

In turning our attention to Lowell at large, we find much more than we can ever allude to, which deserves serious attention. The city is supplied with water from wells, though a project for bringing water for domestic purposes, from the Merrimack river, has been proposed. Sewerage and drainage are in a very imperfect condition in many parts of the city, and many lanes and alleys are without either; the house-slops and other refuse remaining on the surface, especially in wet weather. Filth accumulates in various places, and tells the hygienist where zymotic diseases prevail. Typhus and dysentery especially, which we have seen to be so fatal of late, spring up around these *fomites*. Various memorials and petitions have gone to our city government from the physicians as a body, through the Middlesex District Medical Society. They probably were read, but nothing was ever known of their subsequent history. Means have recently been used for very imperfectly ventilating our school-houses, and some other public buildings, on the plan adopted in Boston.

The rapid influx, especially of foreign population, has placed

small tenements and cellars in high demand, and crowded them infinitely beyond a healthful condition. At this date (April, 1849), in a central district, bounded by Shattuck, Market, Central, and Merrimack streets (the two latter being our principal streets), we find the City Hall, and the offices of mayor, city clerk, treasurer, and engineer, and twelve physicians; the post-office, city library, two churches, three banks, one grammar and three primary schools (embracing an aggregate of eight hundred and thirteen pupils, during the last year), ninety stores (many of our first class), two smithies, several machine shops, a foundry, coal and wood yard, three livery stables, and two hundred and fifty-four tenements, inhabited by one thousand four hundred and forty-five individuals. This district, by the survey of the city engineer, embraces only one-fifteen thousandth of a square mile! Statements like this engender their own comments. From an article in the *Lowell Courier*, of September, 1847, over the signature of J. C., we extract the following: "Few cities are so crowded as Lowell. Various obvious reasons have promoted an influx of labouring population, filling every habitable tenement to an unhealthfully dense degree. We need a health officer, whose only duty should be to see that the laws of public health were complied with. He should visit cellars and hovels, now crammed with filth, and degradation, and disease, which are so numerous in our city. The faithful report of such an officer would astonish the public, for very few are aware of the hundreds of places now inhabited by a horde in a horrid condition. One week ago, I entered a house in a central location, and found it occupied by one store, and twenty-five different families, embracing one hundred and twenty persons, more than half of whom were adults! In one of the rooms, which was inhabited by two families, I found one of the families to consist of a man, his wife, and eight children (four of whom were over fifteen years of age), and four adult boarders! It is criminal to permit such an ill-conditioned ulcer so near the heart of our city, without proper remedial applications. This, by no means, furnishes the worst case of pest germs in Lowell. Indeed, so numerous are the places equally crowded, that one would suppose that the following, which we quote from the *London News*, for June 1, 1847, was describing Lowell instead of London. 'And to crown the sum of misery, Irish paupers are trooping and gathering, in their rags and wretchedness, precisely to those spots where rags and wretchedness, with their concomitant curses of filth and fever, are already huddled together so close that

every fresh arrival steals the air necessary to save other life. These Irish hordes bring with them not only personal nastiness, with filthy and improvident habits, but the seeds of typhus and dysentery.' If we examine the habitations of large numbers in our city, we shall find a woful lack of the necessaries to health, and impure air impregnated with animal effluvia and stenchful exhalations instead. Some three months ago, I had occasion to enter a room, occupied by a sick person by day, and the same, with the addition of a well person, by night. It contained only three hundred and forty-two cubic feet of air! About the same time, it became necessary to visit another room, in the night, which contained only five hundred and thirty-seven cubic feet, and no means for ventilation. For many hours, night after night, it contained no less than six individuals, three of whom were adults.* Although they were induced to leave this hole, and occupy a more airy situation, yet every one of them soon had the 'ship fever,' and from them it was evidently communicated to others. Both of these cases are within ten rods of the post office, though in opposite directions, and are fair specimens of numerous others in our city. Ought not the occupancy of such places to be forbidden? It seems as much a duty to use means for preventing evils, as it is to devise appliances for remedying them." Only one of the above cases, and that the most favourable one, was in the "central district," previously alluded to.

The following letter is from the Rev. Mr. Wood, "minister at large," in Lowell, whose holy duties and humane disposition call him to a surfeiting knowledge of what he says.

"DEAR SIR: In answer to the questions you have addressed me, please accept the following imperfect statements. I find a gross violation of the laws of health and life among the poor. This might be expected of those ignorant of these laws, and trained to little reflection. The nature and quantity of food most conducive to strength and freedom from disease, are not understood. There is much imprudent exposure to the weather, bringing on colds and sickness, entirely unnecessary, if a little knowledge and thought were brought to bear. Labour is often excessive and ill-timed, breaking down noble constitutions; intemperance is the ruin of many.

* The head of this recently emigrated family was quite intelligent, having taught one of the parish schools in Ireland for the last fourteen years.

“There is one infraction of the laws of life and health among the poor, which, I think, should be brought more prominently before the public. This is in connection with their habitations. Their rooms are generally not ventilated at all. From six to ten persons frequently sleep in a single room, and sometimes in one bed. This is particularly the case among our foreign population. The air is stagnant, soon becomes poisonous, and exceedingly offensive. Often every room in the house has from four to twelve inmates, in a narrow lane, perhaps, crowded close with tenements; the little uncovered ground the receptacle of dirty water, rubbish, and corrupt vegetable matter; and numerous outhouses of necessity near to the windows, sometimes filling every room, and the whole neighbourhood with noxious exhalations. Cellars are occupied in very damp locations, where water frequently stands in drops on the walls, and in wet times can be wrung from the sheets of the bed. Two-thirds of the inhabitants of the city, probably, would not deposit their vegetables where not a few families reside, and pay from \$150 to \$2 per month for rent. There are many cellars under ground, with only one or two half windows, and a few panes of glass, where the poor are urged to locate themselves, at a little cheaper rate—urged to gratify avarice, though they take to themselves fevers, rheumatisms, and consumption. I know of one case, where, in two connected rooms in a cellar—and lighted by only three small panes of green glass covered with cobwebs, and where, on entering, I stumbled over the beds, because I could not see them—four families, amounting to twenty-two souls, were living!

“Looking at this subject in only one light, can we suppose that God meant that his creatures should breathe over and over again this noxious and confined air, when abroad, all over the earth, He is continually stirring and filtrating it by wind and rain, that it may be breathed in purity? Sometimes it is almost impossible, after breathing the out-door air, to inhale the air of these rooms. It is well known that this bad air infuses itself into all the clothes hung up and worn in these rooms, and this, connected with the exhalations of a body whose cleanliness is of course almost entirely neglected, attaches to one an effluvia which it must be very unhealthy for the bearer to breathe,* and which clings to him, though he walk against a strong north-wester a whole day; for let him, at the close

* “Of all known poisons, that produced by the concentrated effluvia from a crowd of human beings confined within a small space, and neglectful of cleanliness, is one of the worst.” Dr. A. Combe’s letter to the London Times, Sept. 17, 1847.

of it, enter your room, and he will perceptibly poison the air you are breathing. Shall such a fact be alone an offence to us? Have we no humanity to pity, enlighten, and remove? and more, when we consider the effects of the air breathed! To this, more than to the want of food, I think, may be attributed pale faces, sallow complexions, torpor, and various sicknesses among the poor. May not the sickly appearance of infants in the abodes of poverty, and their early mortality, be often traced to this as a cause? Do we doubt that many pains and distempers and deaths among adults also arise from this? Are not ill health and death, too, among the causes of pauperism, and pauperism more and more dependent and degraded? And it has well been asked, is it not true that many of those morbid appetites and unnatural desires that seek to assuage their longings by indulgence and excess, have their origin in the action of a distempered body upon the mind, rather than of the mind upon the body?*

“This subject assumes a high importance in an intelligent community, and an ascending one with the advance of intelligence. The intelligent philanthropist cannot rest easy. God will not allow him to rest, while no more attention is paid to it.

“I believe that it is the duty of the government of this city to feel a care of this matter, and to exert its authority more than it does. Why should not our city authorities do something to prevent tenements, or cellars of tenements, from being occupied, when there is positive proof that they are, and must be, destructive of health and life? Why should not our government prevent, by law, houses from being jammed together in such unhealthy contiguity as they frequently are, by the cupidity of selfishness? Why, it has been suggested, should government care so much for unusual mortality, and unusual sickness, and so little for the usual, in the aggregate affecting so much more, the prosperity, comfort, and highest interest of the body politic? Something more effectual still may be done by the instruction, in all our schools, of the plain and essential laws of health and life. With our schools, and the young generally, are the power and hope of reformation. The knowledge of these

* Mr. Wood here alludes to an important point. In corroboration, we cite from Dr. Southwood Smith's testimony before the Parliamentary Commission: “The poison generated in these neglected districts, and to which these persons are habitually exposed, is a sedative poison, among the most distinctive characters of which are depressing effects produced by it both on mind and body. This is one of the main causes, not only of the mental apathy of which I have already spoken, but also of that physical listlessness which makes them incapable of any great exertion. I am satisfied that this feeling of depression is one of the chief inducements to the use of stimulants.”

laws thoroughly instilled in early days, advanced to manhood, the children *would not* live in the manner, with the habits and in the localities, of their parents. In this way, too, would be raised up a host of missionaries of light.

“With great regard, yours, &c.

“H. WOOD.”

“To JOSIAH CURTIS, M. D.

“Lowell, April, 1849.”

The above conveys a general idea of some of the worst places in the city which *demand* attention. We cannot leave this matter, however, without an allusion to another, and, probably, the worst district, known as “*The Acre*.” It is inhabited, I believe, exclusively by foreigners, and contains two Roman Catholic churches, but in other particulars, it beggars all description!*

Had we the necessary means of ascertainment, it would be highly interesting to learn the amount of sickness suffered by the community. It is exceedingly difficult, if not absolutely impossible, to obtain the requisite items of information in society at large. The best approximation to the truth is derived by comparing the deaths to the sick in our hospitals, dispensaries, and other institutions for the benefit of the sick. The *Massachusetts General Hospital* went into operation in 1821, and the following table covers the information derived from a file of their Reports:—

TABLE XVII.†

Periods.	Admitted.	Discharged.	Whole No.	Unfit.	Eloped.	Dead.	Not relieved.	Relieved.	Much relieved.	Well.	In sue.	By request.	Misconduct.	Remained.
1821 to 1825	1077	1031	1077	6	13	87	31	268	96	458	3	56	9	44
1826 to 1830	2453	2482	2528	16	11	142	288	323	477	1206		14		54
1831 to 1835	2396	2394	2450	18	23	192	250	314	403	1179	6	4	2	52
1836 to 1840	2036	2034	2088	21	11	152	240	298	427	874				57
1841 to 1845	2003	2046	2061	42	6	193	231	293	378	796				55
1846 to 1848	1937	1886	1991	12	6	196	136	243	258	951	2	2		111
Total	11,932	11,873	11,932	115	70	962	1176	1739	2039	5464	11	76	11	
Cases of Typhus Fever, 1846 to 1848, included above.														
1846 to 1848	203		203		1	14	1	3	6	186	2			1

* The foregoing is, of course, intended only in a hygienic sense. We trust no one will construe the text here, or elsewhere, as offensive to any class of citizens. In all moral points, we prefer to cherish the spirit of Him “who came not to condemn the world.”

† The above table, though from official documents, exhibits some slight inaccuracies.

Here, it will be perceived that, of the 11,932 cases treated, 962 died, being one in 12.4, or 8.06 per cent. The different diseases, and the mortality therefrom, are not specified, excepting the cases of fever during the years 1846 to 1848 inclusive, which are appended above. The mortality from this disease was one in 14.5, being 6.9 per cent.

The *McLean Asylum for the Insane*, connected with this establishment, is located two miles from the city, at Somerville. The condition of this department, since it came under the professional superintendence of its present incumbent in 1836, is shown in the subjoined table:—

TABLE XVIII.

Periods.	Admitted.	Discharged.	Whole No.	Dead.	Improved Not do. and unfit.	Well.	Remain.
1837 to 1840	545	491	616	43	158	290	125
1841 to 1845	690	665	815	76	225	360	151
1846 to 1848	461	451	612	65	152	234	155
Total	1696	1607		184	535	884	155

For the sake of completeness and comparison, respecting this unfortunate class of our citizens, we here annex some statistics of the *State Lunatic Hospital* located at Worcester. They are abstracted from the annual reports of that institution to the legislature.

TABLE XIX.

Periods.	Admitted.	Recovered.	Improved.	Not improved.	Died.	Eloped.
1833 to 1835	385	141	52	50	20	3
1836 to 1840	811	365	120	136	70	1
1841 to 1845	1110	532	158	210	85	
1846 to 1848	778	393	86	152	98	2
Total	3084	1431	416	548	273	6

TABLE XX.

Showing some of the Causes of Insanity as affecting persons pursuing different avocations.

VOCATIONS.	Intemperance.	Ill health.	Masturbation.	Domestic affliction.	Religion.	Property.	Disappointed affection.	Epilepsy.	Jealousy.	Total.
Farmers . . .	65	18	29	27	27	29	4	9	3	211
Labourers . . .	88	10	15	8	10	9	1	6	32	149
Seamen . . .	34	5	7	3	7	6	1	3	66	
Merchants . . .	14	5	32	5	4	20	1	3		84
Carpenters . . .	17	7	9	2	10	6	3	2		56
Shoemakers . . .	9	7	27	5	10	6	2	1		67
Blacksmiths . . .	4	1	1	1	2	4	3			16
Students . . .		3	22	2	2			1		30
Clergymen . . .	1	2	4		1	1	1			10
Lawyers . . .	2		2	1		1				6
Physicians . . .	2					1	1			4
Painters . . .	1		11	2	1	1	1	1		18
Manufacturers . . .	9	3	4	1	4	4	1			26
Totals	246	61	163	57	78	88	19	23	8	743

The *Boston Dispensary* has now been established more than half a century. This charity employs eleven physicians and three apothecaries. The following table, compiled by Mr. Shattuck, shows the character and results of their gratuitous labours for the years 1841 to 1845 inclusive.

TABLE XXI.

Results.	1841.	1842.	1843.	1844.	1845.	Total.
Recovered	1861	1524	2115	1796	1540	8836
Died	88	87	79	87	71	412
Relieved	185	136	199	193	300	1013
Not relieved	20	16	31	19	65	151
Removed	130	115	90	83	166	584
Remained	85	61	98	83	78	405
Not stated	14	18	48	56	62	198
Total No. of cases	2383	1957	2660	2317	2282	11,599
Places of birth.						
Boston	272	86	119	96	100	673
American	613	302	486	428	388	2217
Hibernico-American	611	514	629	752	671	3177
Ireland	771	823	1269	926	911	4700
British	86	47	77	78	129	417
Others	30	49	78	37	82	276
Habits.						
Temperate	1879	1827	2124	1979	1604	9431
Intemperate	313	127	164	74	96	774
Children of intemperate parents	70	3		25	61	159

We have not the reports of the "City Hospital for the Poor," at S. Boston; "The Deer Island Pauper Hospital;" "The Home for the Destitute," &c.

The *Lowell Hospital* commenced operations in May, 1840. It has never made any report, save in a few newspaper paragraphs. We learn the facts embraced in the following table from a paper recently read by its physician, before the Middlesex Dist. Med. Society, and from the Secretary of the Board of Trustees.*

* It is proper here to remark, that this is a private institution, intended to benefit those engaged in the mills. But a small proportion, however, of our sick operatives find their way to the hospital. Some are too ill to be removed from their boarding-houses to the hospital before it is known to the officers of that institution; others improperly attach a certain degree of odium to the idea of being sick in a "hospital;" and others, again, very properly prefer to select their own medical attendant, when sick. The corporations own the boarding-houses, and let them to various individuals, subject to certain regulations, and require, with few exceptions, their operatives to board in them. Within the last twelve months, the agents of the several manufacturing companies, who constitute the Board of Trustees to the Hospital, issued a circular to each boarding-house, for the purpose of inducing and urging, to use no stronger term, the sick among their employed to resort to the hospital. This circular terminates with the following sentence: "It is requested that all boarding-house keepers will use all proper means to induce the sick among their boarders to avail themselves of its privileges; and notice is hereby given, that a neglect or refusal, on the part of the occupant of any boarding-house, to carry out this request, will be considered sufficient cause for terminating the occupancy of said house."

It is not to be supposed from this, however, that the hospital will hereafter furnish an index of the sickness among the operatives.

TABLE XXII.
Exhibiting Statistics of the Lowell Hospital since its Organization in May, 1840.

The foregoing table exhibits the remarkable fact, that, of the 1,627 patients, 827 had the typhoid fever. Of these cases, there was one death in 20.16, or 4.96 per cent.; of other cases, there was one death in 22.86, or 4.37 per cent.; of the whole, one in 21.4, or 4.67 per cent. These favourable results are, in part, accounted for in the following manner: we quote from the MS. paper of the physician before alluded to. "It is to the advantage of the Lowell Hospital, no doubt, that its patients are taken from a class of individuals better able to withstand disease than those who ordinarily find their way into a similar city institution. The operative population of Lowell are young, robust, and generally free of constitutional infirmities. Indeed, it is just such a class as we should suppose would pass through sickness in the shortest time, and with the least danger. Such circumstances, I say, are *obviously* in favour of our Lowell population."*

The *Lowell Dispensary* received its charter from our legislature in 1836. It appoints three physicians, who render gratuitous services. No reports have ever been made.

The intention and character of our hospitals are such as to preclude the general applications of their results to the whole community, as indicative of the ratio which the sick bear to the deaths. The Boston Dispensary, which is an entirely eleemosynary institution, furnishes the fairest comparison. It was shown in Table XXI., page 526, that there was a little over 28 cases of sickness to one death, ($11,599 + 412 = 28.15$.) During the four preceding years, the results were nearly the same, ($10,730 + 379 = 28.31$.) This coincides with results found by some eminent English statists, who have given this point greater attention. Dr. Lyon Playfair, in his very able

* The following extract is also worthy of record. "From the statements here furnished, it appears quite obvious that typhoid fever is not only a very constant, but also the most important, disease among our operative population. It gives no evidence of the proportion it bears to the same disease, as it occurs with the rest of our adult population. Nevertheless, I think it must have been impressed upon the conviction of every physician of several years' standing in our city, that our operatives, as a class, have suffered from it to a much greater degree than the citizens at large. If such is the fact, it becomes a matter of interest to inquire why it is so; and then, again, to ascertain if it is an evil which admits of a remedy, and if so, what it is. * * * * My own opinion, however, is, that *imperfect ventilation*, in our cotton-mills, particularly, may have a very important bearing upon the question of causes of fever among our operative population. * * * * Air thus confined for the space of several months, in rooms occupied by some fifty persons, for twelve hours every day, except Sundays, must, sooner or later, make an impression upon the constitution, and thus indirectly, at least, become the means of inducing disease."

report to the Health of Towns Commission, on the sanitary condition of large towns in Lancashire, (which embraces Liverpool, Manchester, &c.,) states that, "out of 324,041 cases (excluding slight accidents), admitted into the Manchester medical institutions during twelve years, there have been 11,587 deaths, that is, about twenty-eight cases of sickness to one death." But some writers have supposed this too high for a general estimate.* If we assume that there are only twenty attacks of sickness to one death in a community, it would give 89,000 cases of sickness, of longer or shorter duration, in Lowell, since 1840; of which 49,000 occurred during the last three years, being an annual average of over 16,000! In the city of Boston, on this hypothesis, there have been no less than 457,000 cases of sickness since 1840; of which, 229,700, or 76,566 annually, occurred since 1846.

If we advance another step, and start the inquiry, how much of this sickness might have been prevented, and how much of this death might have been postponed, we enter upon the most impressive characteristic in the province of our report. We see degradation, disease, and death inflicted upon the disobedient public as the direct penalty of violated law. Physical laws are as sacred and obligatory as the Decalogue. Indeed, so imperative are they, that they have been inwrought into the very texture of our frames. The Divine Architect has inscribed upon every one of the scores of bones, every one of the hundreds of muscles, the thousands of blood-vessels, the millions of nerves, with their myriads of filaments, just what each can perform. The chemist, in his laboratory, with the control of elementary atoms, discovers affinitives and repulsives with no nicer delicacy than obtains in the pulmonic alembic, where the blood recognizes a distinction between zotics and azotics; or the gastric crucible, where the crude viands of the table are fitted for conversion into living tissue—the mysterious mutation from death unto life! Nothing is more certain than that we hold the capacities of happiness,† health, and life itself, on certain conditions, and forfeit them, without the right of redemption, by non-compliance. Every infraction is sinning on credit where there is no atonement.

The diseases which are the most fatal among us, are those that are the most easily prevented by hygienic prophylactics; yet they

* Med.-Chirurg. Review, vol. i, No. 1, p. 21.

† "A sound mind in a sound body constitutes a short but full description of a happy state in this world."—*Locke*.

are increasing, and so subtracting from the valuation of human life in our midst, that, in our State, our cities, and villages, longevity is taking the inverse ratio of their increasing density in population.* In this particular, we are falling in the rear of other nations.† The dwellings of the masses, and the factories of the few, seem less cared for than our prisons.‡ Municipal authorities dictate the mode of building for the protection of property, but not for the protection of life. Typhus, dysentery, and struma visit the offending,

* Dr. E. Jarvis, an eminent hygienist, has demonstrated this. We quote from him, with some additions: (*Petition of the American Statistical Association to the Legislature of Massachusetts for a Sanitary Survey of the State.—House Doc. No. 16, 1848, and 66, 1849.*)

“The average of all whose deaths are recorded, was in

MASSACHUSETTS.

1842,	34 years 9 months.
1843,	33 " 10 "
1844,	33 " 9 "
1845,	30 " 9 "

DORCHESTER.

1817 to 1829,	33 " 11 months.
1830 to 1843,	31 years 2 "

CONCORD.

1779 to 1808,	39 " 7 "
1809 to 1842,	36 " 0 "

BOSTON.

1811 to 1820,	27 " 3 "
1821 to 1830,	25 " 11 "
1831 to 1840,	22 " 9 "
1841 to 1845,	21 " 5 "

LOWELL.

1836 to 1840,	17 " 1½ "
	1841 to 1845,

1841 to 1845,	17 " 0 "
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† We give but a single instance from many that might be adduced.

“Geneva (Switzerland) has arrived at a high state of civilization, and this wonderful improvement is attributed, among other things by M. Mallet, to the information obtained under their system of registration, rendering the science of public health better known and understood.” This city has kept a faithful registration for *three centuries*. Longevity appears as follows:—

Period.	Years.	Months.	Days.	Rate of increase.
1550 to 1600	8	7	26	100
1600 " 1700	13	3	16	153
1701 " 1750	27	9	13	321
1751 " 1800	31	3	5	361
1801 " 1813	40	8	10	470
1814 " 1833	45	0	29	521

“Showing that the mean duration of life has increased more than five times during these periods.” (*Ibid.*)

‡ Says Finlayson, of the National Debt Office, Eng., “A Benefit Society, (as life or health insurance,) founding its calculations on the scale of prison mortality, would fail in three years.” There is not a State’s Prison, or House of Correction, in New England, where the hours of labour are so long, the hours for meals so short, or the ventilation so much neglected, as in all the cotton-mills with which I am acquainted. See also page 517, *note*.

especially in dense, urban localities.* Harpy-like, they prey upon personal filth. They make their deadly visitations not only among the 40,000 who dwell in cellars in Liverpool, the 18,000 who live below the level of the ground in Manchester, and the similar class in Glasgow, Leeds, and London; but also the occupiers of dark† nurseries of pestilence in Boston and Lowell, and other places. The germs of malignant disease, incubated in these nests, extend their infectious toils to those who visit to counsel and succour, as well as spread over juxtaposed localities. Among the former, the ministers of Gospel consolation, and the administerers of medical relief, suffer most.‡ Between the last two annual meetings of the medical society of this State, seven of its members died in this city, (Boston.) Four of these died of fever, contracted while on professional duty. The best of testimony informs us that near 4,000 deaths, and over 75,000 cases of sickness, might have been avoided in Boston within the last three years! and that over 800 deaths, and 16,000 attacks of sickness might have been prevented in Lowell, within the same time! When we take into account the mental and physical strength lost to the community, in time and labour, the cost of sickness, expense of funerals, &c., no arithmetic can calculate the detriment sustained *unnecessarily* by preventable disease and death, even in a pecuniary view. Had such a tax upon the public resources, and such a waste of human life been sacrificed in war, it would have received greater attention.§

* The Registrar-General (an officer unknown on the Continent of America), divides London into three groups, each having ten districts. The first contains 202 square yards to each person, and the mortality is one in 49; the second affords 102 square yards to each person, and the mortality is one in 41; the third allows 32 square yards to each individual, and the deaths are one in 36. Rev. Mr. Clay, of Preston, makes four classes of streets in that place, and the well-conditioned have a mortality, among children under one year old, of 15 in 100; the moderately-conditioned, 21 in 100; the ill-conditioned, 38 in 100; the worst-conditioned, 44 in 100; or nearly three times as great as the first! Instances of the kind might be given *ad libitum*.

† "Where the sun does not come, the physician must."—*Neapolitan Proverb*.

‡ Says the editor of the *London Journal of Health*, "Some idea of this calamity may be obtained, from the fact that, out of twenty-five medical officers engaged in the relief of the parish poor of Liverpool, twenty have had the fever." "Within the last few months," he continues, "no fewer than twenty-three (Catholic) priests have perished by fever; of these, ten died in Liverpool, and five in Leeds." "In Canada, twenty Catholic priests, including one bishop, have recently died of fever."

§ "The awful results of war are not confined to the bloody scenes of the battle-field; but disease—slow, consuming disease—more than any of the instruments of war, scatters death among those engaged in the trying fatigues and exposures of military duty. Of those who have died in active service in MEXICO, the proportion of those cut down

In England, where they have paid large attention to these evils by investigations, and the application of remedies,* we find results so ghastly, as to be incredible, were they not susceptible of mathematical demonstration. Says Dr. Southwood Smith, "It is no exaggeration to state that the annual slaughter in England and Wales, from preventable causes of typhus, which attacks persons in the vigour of life, is double the amount that was suffered by the allied armies in the battle of Waterloo!" Lord Morpeth (now Earl of Carlisle), remarked, in the British Parliament, in a speech of April 30th, 1847, that, in the various large towns in England, there were annually "above 700,000 cases of unnecessary sickness," and in the metropolis alone, "there were 250,000 cases of unnecessary sickness, and 10,000 deaths that might have been saved!" "There are items of expense," he observes, such as "direct attendance on the sick; loss of what they would have earned; premature death of productive contributors to the national wealth, and expense of premature funerals." Dr. Playfair estimates this loss for Manchester at nearly £1,000,000, and for the whole of the county of Lancaster at £4,800,995; Mr. Hawkesley calculates the loss for Nottingham at £300,000; Mr. Clay estimates the loss for Ashton-under-Lyne at £235,000; and Dr. Playfair considers the loss of London to be above £2,500,000; and that of England and Wales to be little short of £11,000,000; and of the United Kingdom, £20,000,000, or nearly \$100,000,000! And this an annual loss!

Like causes produce like effects. The laws of health and of zymotics, which prevail in Old England, also are operative in New

by disease to those who fell on the battle-field, is about *five to one!*"—GENERAL TAYLOR's *Address to the Volunteers returned from Mexico*. While the number of the "killed and wounded" has been carefully preserved, the above has fallen almost lifeless from the lips of the "hero of many battles."

* Within a few months after the Sanitary Act went into force, Liverpool closed 7,840 cellars, and condemned 1,616 filthy houses. In Manchester, the sanitary officers go round daily, and inspect every lodging-house, and make returns to the chief constable, of the names of the owners and occupiers, the number and size of the rooms, the number of inmates in each room, the condition as to ventilation, furniture, beds, state of the walls, floors, &c., and all nuisances existing near. By the 86th section of the Manchester Police Act, the occupier of every house or dwelling is required to whitewash, purify, and cleanse the same, on receiving notice so to do, under a penalty of 5s. for each day's delay. On their first visit, the inspectors serve notices, where circumstances call for them. Night soil and other filth are forthwith reported to the Nuisance Committee. On their second visit, the inspectors are accompanied by three men, one of whom carries a bucket of whitewash, and the other two, in any house not whitewashed in the interval following the notice, proceed at once to whitewash and cleanse every room.

England. The experiments of Thenard and Dupuytren proved for both trans-atlantic and cis-atlantic regions, that birds perish when the vapours of sulphuretted hydrogen and ammonia exist in the atmosphere to the extent of a fifteen-thousandth part; that dogs are deprived of life when the air contains a thousandth part; and that man cannot live when the air he breathes is impregnated with a three-hundredth part; and suffers in a corresponding degree, when there is a less proportion of this poisonous gas, produced from the decomposition of feculent matter which we leave in our streets, and suffer to diffuse itself from overflowing privies and urinaries, to pollute the atmosphere inhaled, and waters imbibed.* If the losses from evident neglect in hygienic precautions in our cities could be accurately estimated, the statements would be astounding. To them would be applicable the language of a foreign writer, "Halve or quarter every item, if they appear exaggerated, and there would still remain the most remarkable *exposé* ever yet made of municipal and national extravagance. One broad principle," he adds, "may be enunciated in sanitary economics—that it costs more money to create disease than to prevent it."

This subject, in its moral, domestic, physical, and pecuniary bearings, commends itself to the clergyman, the philanthropist, the physician, and the statesman.

Dr. Guy, of King's College, London, &c., says, "I do not fear the charge of exaggeration, when I claim for the sanitary question, the right to be regarded THE great question of the day. Look at it as a question of humanity, and it will not suffer by comparison with the highest efforts of the philanthropist; regard it as a great act of justice, and here, too, you will acknowledge it prefers peculiar claims to consideration; measure it by the rule of economy, and I hesitate not to affirm that it stands without a rival; or view it in its moral relations and reactions, and I know not whether even the great question of education will take rank before it."

All look to our profession, as the guardians of public health, for the light of information. Be it ours to furnish a full supply. It is the most pleasant, as well as the most important, duty of the members of this Association, to point out and illustrate facts and principles, which, if observed, will *prevent* disease, promote attainable

* The compounds of Ellerman, Ledoyen, Sir Wm. Burnett, and others, have stronger claims to the epithet *deodorants* than *disinfectants*; though the metallic salts, (sulphates of iron and copper, the nitrate of lead, and chloride of manganese, &c.,) of which some of them are composed, possess the latter property.

longevity, and thus add to the great world-stock of human happiness and human usefulness. To exhibit remedial agents to the sick, like the execution of criminal law upon the offending, is a necessary evil to overcome a greater one still existing. It is the *opprobrium artis* to the physician. In this matter, then, a responsibility, hard to be over-estimated, rests upon the profession. Who has not felt the high responsibility of our vocation, when called upon to render some sacred service—perhaps to enter within the precincts of the penetralia, with a grasp of the hand and a look which seem to say, “I confide to your skill and knowledge my all of earth. Fail not, I beseech you, to summon all your powers; I conjure you to command all your skill to relieve distress, to abridge agony, to augment happiness, and prolong life, and you shall have your reward!” May this be typical of our action on this subject! May the echo, as if from the spirit of Hygeia, fall with lingering reverberations on the heart—“Fail not to do all in your power to diminish distress, augment happiness, and prolong human life; and you shall have a rich reward.”

LOWELL, April 30th, 1849.

TABLE XXIII.

Showing the Mortality from different Diseases in Massachusetts for five years, viz., from 1844 to 1848 inclusive.

DISEASES.	Number of deaths in					In each 10,000 deaths there were in				
	1844.	1845.	1846.	1847.	1848.	1844.	1845.	1846.	1847.	1848.
I. Zymotics.										
Cholera	28	45	40	92	46	40	56	46	89	46
Cholera infantum	87	111	258	224	172	123	138	294	217	173
Croup	122	261	218	277	265	172	323	250	268	267
Diarrhoea	30	24	55	271	245	42	30	63	263	246
Dysentery	120	200	122	410	1074	170	248	140	397	1079
Erysipelas	104	111	84	53	60	147	137	96	51	60
Fever, intermittent		3	5	2	3		4	6	2	3
Fever, remittent	2	6	12	6	9	3	7	14	6	9
Fever, typhus	634	772	614	944	1202	896	957	703	915	1208
Hooping-cough	60	68	100	104	77	85	84	114	101	77
Influenza	68	16	16	28	27	96	20	18	27	27
Measles	32	44	46	136	43	45	54	53	132	43
Scarlatina	328	538	516	418	176	463	667	590	405	177
Small-pox	11	5	32	12	21	16	6	37	12	21
Syphilis		3	1	1	1		4	1	1	1
Thrush	1	1	2	4		1	1	2	4	
Totals	1627	2208	2121	2982	3421	2299	2736	2427	2890	3437
II. Sporadics.										
Abscess	9	3	13	10	14	13	4	15	10	14
Atrophy	50	18	13	38	40	71	22	15	37	40
Cancer	94	99	113	118	114	133	123	129	114	114

DISEASES.	Number of deaths in					In each 10,000 deaths, there were in				
	1844.	1845.	1846.	1847.	1848.	1844.	1845.	1846.	1847.	1848.
Debility	21	15	13	37	29	35	19	15	36	29
Dropsey	163	181	235	277	250	230	224	269	268	252
Gout	2	5	5	3		3	6	6	3	
Hemorrhage	20	28	30	25	40	28	35	34	24	40
Inflammation	35	6	31	27	31	49	7	35	26	31
Malformation	4	4	4	8	5	6	5	5	8	5
Mortification	25	26	24	44	186	35	32	27	43	187
Scrofula	27	42	31	41	27	38	52	35	40	27
Sudden	27		19	27	24	38		22	26	24
Tumour	6	12	12	19	23	9	15	14	18	23
Totals	487	439	543	674	783	688	544	621	653	787
III. Of the Nervous System.										
Apoplexy	82	82	69	90	78	116	101	79	87	78
Cephalitis	92	94	38	54		130	116	44	52	
Chorea	3	2	2	2	1	4	3	2	2	1
Convulsions	130	204	146	237	245	184	254	167	230	246
Delirium tremens		13	17	24	21		16	19	23	21
Epilepsy	15	7	13	14	6	22	9	15	13	6
Hydrocephalus	129	189	231	233	197	182	234	264	226	198
Insanity	10	12	9	24	35	14	15	10	23	35
Paralysis	111	117	177	164	138	157	145	203	159	139
Tetanus	3	5	3	9	13	4	6	3	9	13
Diseases of organs	56	69	64	79	118	79	85	74	77	119
Totals	631	794	769	930	852	892	984	880	901	856
IV. Of the Respiratory System.										
Asthma	4	9	6	12	9	6	11	7	12	9
Bronchitis	15	12	12	19	22	21	15	14	18	22
Consumption	1634	2072	2104	2397	2387	2309	2567	2407	2324	2399
Hydrothorax	16	49	18	16	15	23	61	20	15	15
Laryngitis	2	5	1	5	3	3	6	1	5	3
Pleuritis	25	20	33	47	37	36	25	38	46	37
Pneumonia	337	350	235	501	432	476	434	269	486	434
Quinsy	3	11	9	14	6	4	14	10	13	6
Diseases of organs		14	29	31	26		17	33	30	26
Totals	2036	2542	2447	5032	2937	2878	3150	2799	2949	2951
V. Of the Circulatory System.										
Aneurism	2	3	3	3		3	4	4	3	
Pericarditis		13	1	2	3		16	1	2	3
Diseases of organs	139	120	147	202	225	196	148	167	196	226
Totals	141	136	151	207	228	199	168	172	201	229
VI. Of the Digestive System.										
Ascites										
Colic	15	34	12	16	22	21	42	14	15	22
Dentition	24	31	30	61	69	34	38	34	60	69
Dyspepsia	6	12	8	12	8	8	15	9	12	8
Enteritis	116	145	132	118	107	165	179	151	114	108
Gastritis	16	11	4	19	13	22	13	4	18	13
Hepatitis	4					6				
Hernia	19		9	12	7	28		10	12	7
Intussusception	17	5	5	2	1	24	6	6	2	1
Jaundice	7	12	14	24	18	10	15	16	23	18
Peritonitis	16	12	5	7	2	23	15	6	7	2
Ulceration	23					32				

DISEASES.	Number of deaths in					In each 10,000 deaths, there were in				
	1844.	1845.	1846.	1847.	1848.	1844.	1845.	1846.	1847.	1848.
Worms	4	10	7	14	6	6	12	8	13	6
Diseases of liver	27	51	49	63	57	37	63	56	61	57
“ spleen										
“ organs	139	194	53	45	39	196	243	61	44	39
Totals	433	517	328	393	349	612	641	375	381	350
VII. Of the Urinative System.										
Cystitis	5	5	3	4	3	7	6	3	4	3
Diabetes	7	7	15	16	14	10	9	17	15	14
Gravel	11	9	9	10	15	15	11	10	10	15
Nephritis	9	3		5	1	13	4		5	1
Diseases of organs		8	9	13	24		10	11	13	24
Totals	32	32	36	48	57	45	40	41	47	57
VIII. Of the Generative System.										
Childbirth	30	52	45	69	69	42	65	52	67	69
Paramenia	1						1			
Puerperal fever	33	35	30	25	33	47	43	34	24	33
Diseases of organs	4	8	5	13	2	6	10	6	13	2
Totals	68	95	80	107	104	96	118	92	104	104
IX. Of the Locomotive System.										
Rheumatism	14	17	13	21	15	20	21	15	20	15
Diseases of hip	1	2	3	8	4	1	3	3	8	4
Diseases of joints		1	2	5	1		1	2	5	1
Diseases of spine	19	14	21	20	30	27	17	25	19	30
Totals	34	34	39	54	50	48	42	45	52	50
X. Of the Integumentive System.										
Fistula		1		1			1		1	
Purpura	3	4		4	2	4	5		4	2
Ulcer	8	10	9	11	7	12	12	11	10	7
Diseases of organs	1	2	1	4	1	1	3	1	4	1
Totals	12	17	10	20	10	17	21	12	19	10
XI. Of Age.										
Infantile	663	450	1187	708	183	937	558	1358	686	184
Senile	631	504	688	733	633	892	624	787	711	636
Totals	1294	954	1875	1441	816	1829	1182	2145	1397	820
XII. Of External Causes.										
Accident	86	87	131	133	142	122	108	150	129	143
Burns and scalds	22	33	36	27	27	31	41	41	26	27
Drowned	88	114	115	178	100	124	141	131	172	101
Executed										
Frozen	1			1		1			1	
Heat				4					4	
Intemperance	40	23	19	30	27	57	29	22	29	27
Lightning				1					1	
Malpractice	1					1				
Murdered	5			2	2	7			2	2
Poisoned	6	10	5	4	7	9	12	6	4	7
Suffocated		6	5	3	4		7	6	3	4
Suicide	32	29	31	36	38	45	36	35	35	38
Totals	281	302	342	419	347	397	374	391	406	349

RECAPITULATION OF TABLE XXIII.

40

CLASSES OF DISEASES.	Number of deaths in						In each 10,000 deaths, there were in					
	1844	1845	1846	1847	1848	1844 to 1848	1844	1845	1846	1847	1848	1844 to 1848
I. Zymotics Sporadics	1627	2208	2121	2082	3421	12,350	2299	2736	2427	2890	3437	2798
II. Of General Location	487	439	543	674	783	2926	698	544	621	653	787	663
III. Of Nervous System	631	794	769	930	852	3976	892	984	880	901	856	900
IV. Of Respirative System	2036	2542	2447	3042	2937	13,004	2878	3150	2799	2994	2951	2944
V. Of Circulative System	141	136	151	207	226	863	199	168	172	201	229	196
VI. Of Digestive System	433	517	325	393	349	2020	612	641	375	381	350	458
VII. Of Urinative System	32	32	36	48	57	205	45	40	41	47	57	47
VIII. Of Generative System	68	95	80	107	104	454	96	118	92	104	104	103
IX. Of Locomotive System	34	34	39	54	50	211	48	42	45	52	50	48
X. Of Integumentive System	12	17	10	20	10	69	17	21	12	19	10	16
XI. Of Age	1294	954	1875	1441	816	6380	1829	1182	2145	1397	820	1444
XII. Of External Causes	281	302	342	419	347	1691	397	374	391	406	349	383
Total of specified	7076	8070	8741	10,317	9954	44,158	10,000	10,000	10,000	10,000	10,000	10,000
Not specified causes	1262	572	470	499	1249	4052						
Stillborn	49	73	109	149	143	523						
Grand total	8387	8715	9320	10,965	11,346	48,733						

TABLE XXIV.

Illustrating the Influence of Season on Longevity in Massachusetts, from 1844 to 1848, inclusive.

	Whole number of deaths in					Total	
	1844	1845	1846	1847	1848	Number of deaths 1844 to 1848	In 10,000, there were 1844 to 1848
May	602	571	728	722	746	3379	693
June	548	507	653	722	728	3158	648
July	600	715	677	895	943	3830	785
August	831	936	1018	1339	1362	5486	1126
September	940	952	985	1396	1611	5874	1206
October	769	845	820	1066	1114	4614	947
November	649	653	652	791	780	3525	723
December	725	677	718	800	731	3651	749
January	650	687	695	754	819	3595	738
February	642	696	744	784	844	3710	761
March	655	767	826	867	865	3980	817
April	590	709	814	814	803	3730	766
Unknown	186			15		201	41
Total	8387	8715	9320	10,965	11,346	48,733	10,000

TABLE XXV.

*Illustrating the Influence of Age on Longevity in Massachusetts
from 1844 to 1848, inclusive.*

	Number of deaths in					Total	
	1844	1845	1846	1847	1848	Number of deaths 1844 to 1848.	In 10,000, there were 1844 to 1848.
Under 1	1313	1551	1695	1946	1945	8450	1734
1 to 2	551	697	676	1000	976	3900	800
2 " 5	566	739	682	879	944	3810	782
Under 5	2430	2987	3053	3825	3865	16160	3406
5 to 10	334	354	461	494	453	2096	430
10 " 20	536	592	675	707	743	3253	668
20 " 30	858	995	1041	1251	1422	5567	1142
30 " 40	671	704	752	890	975	3992	819
40 " 50	485	508	573	717	737	3020	620
50 " 60	437	500	480	613	671	2707	554
60 " 70	602	541	609	691	674	3117	640
70 " 80	751	705	735	826	823	3840	788
80 " 90	578	462	611	677	620	2948	605
90 " 100	137	107	150	156	132	682	140
Over 100	4	6	6	9	9	34	7
Unknown	564	254	174	109	222	1323	271
Total	8387	8715	9320	10,965	11,346	48,733	10,000

TABLE XXVI.

Showing the Mortality from different Diseases in Boston, since the date of the City Charter, viz., from 1821 to 1848, inclusive.

DISEASES.	Number of deaths in								In each 10,000 deaths, there were in							
	1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848			1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848		
	I. Zymotics.															
Cholera	34	26	124	40	33	33	69	56	172	50	32	31				
Cholera infantum	43	46	70	228	223	190	87	100	99	285	219	181				
Croup	94	151	211	204	319	290	191	326	298	255	313	276				
Diarrhoea	58	8	15	37	48	154	118	17	22	46	47	147				
Dysentery	221	142	172	218	126	552	450	307	243	273	124	526				
Erysipelas	1	11	28	46	101	42	2	24	39	57	99	40				
Fever, intermittent	1	4	7	6	6	1	2	9	10	7	6	1				
" remittent		4	2				8	4								
" typhus	297	294	418	385	498	1093	603	635	591	481	488	1041				
Hooping-cough	88	96	158	168	201	107	179	208	223	210	197	102				
Influenza	7		53	19	34	18	14		82	24	33	17				
Measles	231	101	263	78	197	181	470	218	372	97	193	172				
Scarlatina	12	36	487	485	812	342	24	78	689	606	796	325				
Small-pox	2	6	17	197	185	136	4	13	24	246	182	129				
Syphilis	10	7	9	8	10	6	20	15	13	10	10	6				
Thrush	1	3		3	99	2	2	6		4	97	2				
Totals	1104	933	2032	2122	2892	3147	2243	2016	2877	2651	2836	2996				
II. Sporadics.																
Abscess	23	14	20	20	27	18	47	30	28	25	26	17				
Atrophy	36		43	168	214	225	73		61	210	210	214				
Cancer	34	24	46	57	72	54	69	52	65	71	71	52				
Debility	34	48	89	43	151	76	69	104	126	54	148	72				
Dropsy	133	104	155	166	197	157	270	225	219	207	193	149				

DISEASES.	Number of deaths in						In each 10,000 deaths, there were in					
	1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848	1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848
	1821	1826	1831	1836	1841	1846	1821	1826	1831	1836	1841	1846
Gout	6	2	2	2	1		12	4	3	2	1	
Hemorrhage	3	7		21	34	25	6	15		26	33	24
Inflammation	3	23	9	26	5		6	50	13	33	5	
Malformation				2						2		
Mortification	40	37	41	24	15	17	81	80	58	30	15	16
Serofula	18	17	31	41	62	23	37	37	44	51	61	31
Sudden	62	21	35	61	62	26	126	45	50	76	61	25
Tumour	4	8	18	18	51	40	8	17	25	22	50	38
Totals	396	305	489	649	891	671	804	659	692	809	874	638
III. Of the Nervous System.												
Apoplexy	45	62	73	115	99	67	91	134	103	144	97	64
Cephalitis	51	22	21	77	57	104	104	47	30	96	56	99
Chorea						1						1
Convulsions	139	170	215	264	263	250	282	368	304	330	258	237
Delirium tremens	23	15	24	48	27	25	47	32	34	60	26	24
Epilepsy	6	6	5	5	13	3	12	13	7	6	13	3
Hydrocephalus	89	181	248	306	429	361	180	392	351	381	421	344
Insanity	8	14	12	8	16	1	16	30	17	10	16	1
Paralysis	63	50	74	58	92	78	128	108	104	72	90	74
Tetanus	3	3	3	6	5	5	6	6	4	8	5	5
Diseases of organs	3	27	59	96	66	63	6	58	83	120	65	60
Totals	430	550	734	983	1067	958	872	1188	1037	1227	1047	912
IV. Of the Respirative System.												
Asthma	8	5	9	20	7	8	16	11	13	25	7	8
Bronchitis			3	3	25	23		4	4	24	22	
Consumption	1032	1022	1143	1163	1543	1608	2096	2207	1616	1454	1513	1531
Hydrothorax	24	23	18	29	19	21	49	50	25	36	19	20
Laryngitis					10					10		
Pleuritis	22	18	39	51	57	82	45	39	55	64	56	78
Pneumonia	254	326	511	561	753	617	516	704	721	701	738	587
Quinsy	28	15	22	13	22	8	57	32	31	16	22	8
Diseases of organs	15	10	9	17	8	16	30	22	13	21	8	15
Totals	1383	1419	1754	1857	2444	2383	2809	3065	2478	2321	2397	2269
V. Of the Circulative System.												
Aneurism	1			4		1	2			5		1
Pericarditis	7	1		5			14	2		6		
Diseases of organs	30	51	83	123	192	168	61	110	118	154	188	160
Totals	38	52	83	132	192	169	77	112	118	165	188	161
VI. Of the Digestive System.												
Ascites												
Colic	13	14	13	19	7	6	26	30	19	24	7	6
Dentition	27	56	121	159	209	124	55	121	171	199	205	118
Dyspepsia	13	2	6	7	7	3	26	4	9	9	7	3
Enteritis	68	94	140	220	322	146	130	203	198	275	316	139
Gastritis	4	5	2	13	27	19	8	11	3	16	26	18
Hepatitis	16	2			1		33	4			1	
Hernia	7	5	1	4	6	8	14	11	1	5	6	8
Intussusception				1	1					1	1	
Jaundice	23	11	12	14	19	22	47	24	17	17	19	21
Peritonitis	5						10					
Ulceration												
Worms	13	13	28	28	30	18	26	28	40	35	29	17

DISEASES.	Number of deaths in						In each 10,000 deaths, there were in					
	1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848	1821 to 1825	1826 to 1830	1831 to 1835	1836 to 1840	1841 to 1845	1846 to 1848
Diseases of liver	11	59	65	47	80	46	22	127	92	59	78	44
Diseases of spleen	1	1	1				2	2	1			
Diseases of organs	64	118	170	166	260	1080	130	255	240	207	255	1027
Totals	265	380	559	678	969	1577	538	820	791	847	950	1501
VII. Of the Urinative System.												
Cystitis	1						1	2				
Diabetes		3	1	4	6	6		6	1	5	6	6
Gravel	10	11	3	4	9	9	20	24	4	5	9	9
Nephritis												
Diseases of organs	4	1	6	4	18	19	8	2	9	5	17	18
Totals	15	15	10	12	33	35	30	32	14	15	32	33
VIII. Of the Generative System.												
Childbirth	17	67	88	99	178	139	35	145	125	124	174	132
Paramenia												
Puerperal fever	34	3		10		7	69	6		12		
Diseases of organs	6	5	2	15		5	12	11	3	19	7	5
Totals	57	75	90	124	185	144	116	162	128	155	181	137
IX. Of the Locomotive System.												
Rheumatism	25	15	20	26	32	18	51	32	28	32	31	17
Diseases of hip						13						
Diseases of joints	10	11	15	15	19	2	20	24	22	19	19	2
Diseases of spine						23						22
Totals	35	26	35	41	51	56	71	56	50	51	50	53
X. Of the Integumentive System.												
Fistula		7				1		15				1
Purpura						1						1
Ulcer		2	16	7	15	18		4	23	9	15	17
Diseases of organs	4	4	5	2	13	1	8	9	7	2	13	1
Totals	4	13	21	9	28	21	8	28	30	11	28	20
XI. Of Age.												
Infantile	657	226	432	551	687	723	1334	488	611	688	674	688
Senile	177	243	312	333	326	214	360	525	441	415	320	204
Totals	834	469	744	884	1013	937	1694	1013	1052	1103	994	892
XII. Of External Causes.												
Accidents	74	65	101	115	128	160	150	141	143	144	126	152
Burns and scalds	41	45	53	70	43	28	83	97	75	87	42	27
Drowned	95	93	88	109	99	83	193	201	125	136	97	79
Executed		1	7	2				2	10	2		
Frozen	1	3	2				2	6	3			
Heat	8	2	3	5	3	5	16	4	4	6	3	5
Intemperance	111	146	198	147	109	76	226	316	250	184	107	72
Lightning												
Malpractice												
Murdered	8		1	4	4	9	16		1	5	4	9
Poisoned	1	5	5	11	4	6	2	11	7	14	4	6
Suffocated	5	2	6	2	6	5	10	4	9	2	6	5
Suicide	19	31	54	52	35	36	39	67	76	65	34	33
Totals	363	393	518	517	431	408	737	849	733	645	423	388

RECAPITULATION OF TABLE XXVI.

CLASSES OF DISEASES.	Number of deaths in						In each 10,000 deaths, there were in					
	1821	1826	1831	1836	1841	1846	1821	1826	1831	1836	1841	1846
	to	to	to	to	to	to	to	to	to	to	to	to
	1825	1830	1835	1840	1845	1848	1825	1830	1835	1840	1845	1848
I. Zymotics	1104	933	2032	2122	2892	3147	2243	2016	2377	2651	2836	2096
<i>Sporadics</i>												
II. Of General Location	396	305	489	649	891	671	804	659	692	809	874	639
III. Of Nervous System	430	550	734	983	1067	958	872	1188	1037	1227	1047	912
IV. Of Respirative System	1388	1419	1754	1857	2444	2383	2809	3065	2478	2321	2307	2269
V. Of Circulative System	38	52	83	132	192	169	77	112	118	165	184	161
VI. Of Digestive System	265	380	559	678	969	1577	538	820	791	847	950	1501
VII. Of Urinative System	15	15	10	12	33	35	30	32	14	15	32	33
VIII. Of Generative System	57	75	90	124	185	144	116	162	128	155	181	137
IX. Of Locomotive System	35	26	35	41	51	56	71	56	50	51	50	53
X. Of Integumentive System	4	13	21	9	28	21	8	29	30	11	29	20
XI. Of Age	834	469	744	884	1013	937	1694	1013	1052	1103	994	892
XII. Of External Causes	363	393	518	517	431	405	737	849	733	645	423	388
Total of specified	4921	4630	7069	8008	10,196	10,506	10,000	10,000	10,000	10,000	10,000	10,000
Not specified causes	1100	816	592	745	249	99						
Stillborn	500	409	406	615	923	890						
Grand total	6524	5855	8129	9367	11,368	11,485						

TABLE XXVII.

Illustrating the Influence of Season on the Longevity of the Sexes in Boston, since the date of the City Charter, viz., from 1821 to 1848, inclusive.

Months.	1821 to 1825.			1826 to 1830.			1831 to 1835.			1836 to 1840.			1841 to 1845.			1846 to 1848.		
	Males.	Females.	Total.															
Jan'y	221	225	446	228	252	480	294	298	592	390	363	753	396	431	827	386	312	698
Feby	183	195	381	209	192	401	271	263	534	357	352	709	412	418	830	333	336	669
March	244	208	452	234	205	439	272	290	562	364	357	721	332	435	767	369	309	678
April	250	203	453	231	223	454	286	282	568	344	314	658	419	425	844	416	378	794
May	244	206	450	247	205	452	252	255	507	300	305	605	449	409	858	444	402	846
June	217	186	403	206	155	361	255	235	490	298	273	571	388	348	736	461	349	810
July	262	245	507	239	195	434	269	250	519	354	319	673	448	402	850	522	476	908
August	295	304	599	281	261	532	365	343	708	476	449	925	575	523	1098	764	683	1447
Sept'r	353	321	674	305	264	572	434	387	821	475	467	942	566	522	1088	604	588	1192
Oct'r	307	299	606	255	245	503	411	363	774	385	399	784	442	424	866	510	395	905
Nov'r	245	267	512	212	203	415	417	363	780	351	360	711	412	396	808	397	397	794
Dee'r	273	268	541	200	203	403	425	381	806	363	338	701	418	455	873	400	372	772
Total	3094	2930	6024	5853	5593	5446	3051	3710	7661	4457	4296	8753	5257	5188	10,445	5606	4997	10,603

TABLE XXVIII.

Illustrating the Influence of Age on the Longevity of the Sexes in Boston, since the date of the City Charter, viz., from 1821 to 1848, inclusive.

Years.	1821 to 1825.			1826 to 1830.			1831 to 1835.			1836 to 1840.			1841 to 1845.			1846 to 1848.		
	Males.	Females.	Total.															
Under 1	530	411	941	599	422	1021	806	629	1435	1196	972	2168	1004	812	1816	1159	1033	2192
1 to 2	237	330	667	243	310	553	424	481	905	722	682	1404	539	580	1119	704	651	1355
2 to 5	219	175	396	209	190	399	462	401	863	690	597	1287	478	419	897	608	507	1115
Under 5	1086	916	2002	1051	922	1973	1602	1511	3203	2608	2251	4859	2021	1811	3832	2471	2191	4662
5 to 10	120	91	211	113	82	195	169	151	320	245	220	465	212	159	371	269	236	605
10 to 20	113	149	262	121	150	271	144	244	388	231	320	551	175	276	451	269	294	562
20 to 30	306	356	662	365	377	742	485	492	977	510	710	1220	478	596	1074	741	690	1431
30 to 40	348	315	663	402	327	729	529	398	927	526	529	1055	504	454	958	687	555	1242
40 to 50	330	237	567	293	229	522	342	266	608	433	293	726	391	295	686	457	330	787
50 to 60	200	183	383	189	148	337	240	198	438	251	257	508	285	214	499	284	237	521
60 to 70	106	152	258	127	135	262	158	187	345	208	228	436	179	195	374	229	197	426
70 to 80	93	133	226	88	115	203	108	154	262	155	230	385	116	171	287	122	166	288
80 to 90	41	71	112	48	66	114	46	75	121	65	122	187	54	83	137	54	81	136
90 to 100	6	15	21	5	11	16	11	17	28	10	20	30	6	22	28	14	19	33
Unknown	345	312	657	51	31	82	27	17	44	15	8	23	36	20	56	9	1	10
Total	3094	2930	6024	2853	2593	5446	3051	3710	7661	4457	4296	8753	5257	5188	10,445	5606	4997	10,603

TABLE XXIX.

Showing the Population of Boston at different Periods.

1810	Under 10.	10 to 16.	16 to 26.	26 to 45.	Over 45.	Totals.	Not White.	Total.						
Males	4430	1869	3679	4408	1363	15,749								
Females	4396	2091	4013	4174	1896	16,570								
Totals	8826	3960	7692	8582	3259	32,319	1468	33,787						
1820							Coloured							
Males	5283	2416	3564	7345	1500	20,108	809							
Females	5399	2965	4544	5973	2569	21,450	931							
Totals	10,682	5381	8108	13,318	4069	41,558	1740	43,298						
1825														
Males	6206	3061	7622	8458	2560	27,907	974							
Females	6309	3616	7589	7735	3204	28,453	943							
Totals	12,515	6677	15,211	16,193	5764	56,360	1917	58,277						
1835														
Males	8636	3743	9633	12,483	3327	37,822	788							
Females	8866	4189	10,120	11,377	4472	39,024	969							
Totals	17,502	7932	19,753	23,860	7799	76,846	1757	78,603						
1830	Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Total.	Coloured.	Total.
Males	3818	2941	2469	3165	7729	4132	2168	1077	475	164	33	28,171	865	
Females	4004	2978	2947	3544	7959	4661	2699	1413	801	325	117	31,346	1010	
Total	7822	5919	5316	6709	15,687	8793	4866	2490	1276	489	150	59,517	1875	61,362
1840														
Males	5711	4246	3368	1043	15,612	9404	3056	1476	606	243	79	47,944	1399	
Females	5535	4463	3553	4142	11,342	6366	3492	1920	951	402	151	43,112	1028	
Total	11,269	5711	6921	8855	26,554	15,970	6542	3396	1557	645	230	90,956	2427	93,383
1845	Under 1.	1 to 2.	2 to 3.	3 to 4.	4 to 5.	Under 5.	5 to 10.	10 to 15.	15 to 16.	16 to 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.
Males	1626	1361	1459	1423	1365	7234	5690	4707	874	4325	7612	7397	6129	4326
Females	1518	1265	1709	1354	1368	7214	5668	4928	952	4798	7765	6821	5699	3827
Total	3144	2626	316	2777	2733	14,448	11,358	9636	1826	9123	15,377	14,218	11,825	8153
Continued	40 to 45.	45 to 50.	50 to 55.	55 to 60.	60 to 65.	65 to 70.	70 to 75.	75 to 80.	80 to 85.	85 to 90.	90 to 95.	95 to 100.	Over 100.	Total.
Males	3117	174	1337	805	714	348	202	113	56	17	8	4	4	56,890
Females	3073	1965	1646	972	916	490	357	191	106	42	11	1	1	57,476
Total	6190	3839	2953	1777	1630	838	580	304	162	59	19	8	1	114,366

TABLE XXX.

Showing the Condition of Dwellings in Boston, in 1845.

Wards.													Total.
	1	2	3	4	5	6	7	8	9	10	11	12	
Brick . .	406	221	572	503	764	652	535	342	620	793	763	82	6253
Wood . .	511	325	335	462	295	281	97	104	204	319	650	976	4559
Total inhab.	917	546	907	965	1059	933	632	446	824	1112	1413	1058	10,812
Inhab. in part	42	116	88	140	43	37	110	110	48	98	74	40	946
“ by 1 family	201	41	120	281	274	255	197	82	280	227	286	281	2325
“ “ 2 “	75	16	35	58	91	58	3	10	25	69	124	97	661
“ “ 3 “	16	4	5	26	10	7	1	2	5	8	14	19	117
“ “ 4 “	2	6	1	6	2	3			5	5	5	2	37
“ “ 5 “	1		1	1		2		1		2	1	1	11
“ “ 6 “								1		1	1	3	6
“ “ 7 “	1								1	1	1		4
These are owned by an inhabitant	296	67	162	372	377	325	202	96	315	313	433	403	3361
Inhabited by 1 family	272	159	312	345	371	264	318	112	266	430	524	370	3743
2 “	206	123	248	138	223	185	54	56	139	178	357	203	2110
3 “	85	52	108	89	60	73	26	33	45	99	66	49	785
4 “	35	54	50	16	21	51	14	19	37	47	21	17	382
5 “	6	26	16	4	4	26	14	29	13	14	4	7	163
6 “	11	25	9	1	2	3	2	20	4	14	3	5	99
7 “	1	15	1		1	3	2	28	1	7	3	1	63
8 “	4	10	1			1		29	1	6		1	53
9 “	1	6				1		11	1	2			22
10 “		2						6	2	1	2		14
10 to 30		7						7		2	1		17
Not owned by an inhabitant	621	479	745	593	682	608	430	350	509	799	980	655	7451
No. families in to each house	1635	1542	1695	1482	1614	1667	871	1461	1325	2006	2223	1654	19,175
No. persons to do.	1.78	2.82	1.86	1.53	1.52	1.78	1.37	3.27	1.60	1.80	1.57	1.56	1.77
“ to family	5.11	6.30	5.93	7.29	5.27	4.90	7.66	5.84	6.46	6.30	5.51	6.05	5.96

TABLE XXXI.

Showing the Mortality from different Diseases in Lowell, since the date of the City Charter, viz., from 1836 to 1848, inclusive.

DISEASES:	Number of deaths in				In each 10,000 deaths, there were in			
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848
I. Zymotics.								
Cholera	6	13	9	28	41	70	37	49
Cholera infantum	80	148	127	355	547	798	529	620
Croup	38	50	86	174	260	270	358	305
Diarrhoea	48	44	30	122	328	237	125	214
Dysentery	54	48	381	483	369	259	1588	844
Erysipelas	7	14	14	35	48	75	58	59
Fever, intermittent	1		1	2	7		4	4
“ remittent								
“ typhus	168	175	322	665	1148	943	1342	1162
Hooping-cough	21	36	21	78	144	194	87	136
Influenza			1		1	5		2
Measles	25	30	46	101	171	162	192	177
Scarlatina	97	96	113	306	663	518	471	535
Small-pox	9	2	22	33	61	11	92	58
Syphilis			1		1	5		2
Thrush	1			1	7			2
Totals	555	658	1172	2385	3794	3547	4883	4169
II. Sporadics.								
Abscess	3	4	5	12	21	22	21	21
Atrophy	23	13	34	70	157	70	142	123
Cancer	2	8	13	23	14	43	54	40
Debility								
Dropsy	15	9	13	37	102	49	54	65
Gout								
Hemorrhage	4	11	8	23	27	59	33	40
Inflammation								
Malformation	8	14	4	26	55	75	17	46
Mortification	4	6	12	22	27	32	50	39
Scrofula	2	10	6	18	14	54	25	32
Sudden								
Tumour	1			1	7			2
Totals	62	75	95	233	424	404	396	408
III. Of the Nervous System.								
Apoplexy	15	21	26	62	102	113	108	107
Cephalitis	66	32	27	125	451	172	113	220
Chorea								
Convulsions	31	54	40	125	212	291	167	220
Delirium tremens	16	14	8	38	110	75	33	66
Epilepsy	2	4	2	8	14	22	8	14
Hydrocephalus	30	110	106	246	205	593	442	429
Hydrophobia			1	1			4	2
Insanity		1		1		5		2
Paralysis	1	3	2	6	7	16	8	11
Tetanus			1	1			4	2
Disease of organs	13	11	38	62	89	59	159	107
Totals	174	250	251	675	1190	1346	1046	1180
IV. Of the Respirative System.								
Asthma		1	5	6		5	21	11
Bronchitis	13	23	13	49	89	124	54	85
Consumption	229	345	355	929	1565	1860	1479	1624
Hydrothorax	2	4	5	11	14	22	21	19

DISEASES.	Number of deaths in				In each 10,000 deaths, there were in			
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848
Laryngitis	2			2	14			4
Pleuritis	11	6	5	22	75	32	21	38
Pneumonia	97	114	113	324	663	615	471	566
Quinsy								
Diseases of organs	3	3		6	21	16		11
Totals	357	496	496	1349	2441	2674	2069	2358
V. Of the Circulative System.								
Aneurism	2	1		3	14	5		5
Pericarditis	5	9	2	16	34	49	8	28
Diseases of organs	15	20	40	75	102	108	167	132
Totals	22	30	42	94	150	162	175	165
VI. Of the Digestive System.								
Ascites		1		1		5		2
Colic	1		1	1	7			2
Dentition	1	7	27	35	7	38	113	61
Dyspepsia		1		1		5		2
Enteritis	23	25	19	67	156	135	7	117
Gastritis	12	15	6	33	82	81	25	58
Hepatitis	3	2		5	21	11		9
Hernia	2	1	1	4	14	5	4	7
Intussusception	5	2		7	34	11		12
Jaundice	4	3	5	12	27	16	21	21
Peritonitis	11	16		27	75	86		47
Ulceration	1		5	6	7		21	11
Worms	2		1	3	14		4	5
Disease of liver		5	7	12			27	21
“ spleen	1			1	7		29	2
“ organs	1	6	7	14	7	33	29	24
Total	67	84	78	229	458	457	325	401
VII. Of the Urinative System.								
Cystitis	1			1	7			2
Diabetes		3		3		16		5
Gravel								
Nephritis								
Diseases of organs	1	5	4	10	7	27	17	17
Totals	2	8	4	14	14	43	17	24
VIII. Of the Generative Syst.								
Childbirth	4	5		9	27	27		16
Paramenia								
Puerperal fever	19	21	26	66	129	113	108	115
Diseases of organs	5	6	1	12	34	32	4	21
Totals	28	32	27	87	190	172	112	152
IX. Of the Locomotive System.								
Rheumatism		1	5	6		5	21	11
Disease of hip								
“ joints	1	1		2	7	5		4
“ spine	1	3	6	10	7	16	25	17
Totals	2	5	11	18	14	26	46	32
X. Of the Integumentive Syst.								
Fistula								
Purpura	4		1	5	27		4	9

DISEASES.	Number of deaths in				In each 10,000 deaths, there were in			
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848
Ulcer								
Diseases of organs	1			1	7			2
Totals	5		1	6	34		4	11
XI. Of Age.								
Infantile	91	128	131	350	622	690	546	612
Senile	11	7	22	40	75	38	91	70
Totals	102	135	153	390	697	728	637	682
XII. Of External Causes.								
Accidents	17	28	52	97	116	149	217	169
Burns and scalds	16	9	25		109	49		44
Drowned	36	20	11	67	246	108	46	117
Executed								
Frozen								
Heat	2		2	4	14		8	7
Intemperance	1	5	1	7	7	27	4	12
Lightning		1		1		5		2
Malpractice								
Murdered								
Poisoned	2	5		7	14	27		12
Suffocated	4	2		6	27	11		11
Suicide	9	12	4	25	61	65	17	44
Totals	87	82	70	239	594	441	292	418

RECAPITULATION OF TABLE XXXI.

CLASSES OF DISEASE.	Number of deaths in				In each 10,000 deaths, there were in			
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848
I. Zymotics	555	658	1172	2385	3794	3547	4883	4169
<i>Sporadics</i>								
II. Of General Location	62	75	95	233	424	404	396	408
III. Of Nervous System	174	250	251	675	1190	1346	1046	1180
IV. Of Respirative System	357	496	496	1349	2441	2674	2069	2358
V. Of Circulative System	22	30	42	94	150	162	175	165
VI. Of Digestive System	67	84	78	229	458	457	325	401
VII. Of Urinative System	2	8	4	14	14	43	17	24
VIII. Of Generative System	28	32	27	87	190	172	112	152
IX. Of Locomotive System	2	5	11	18	14	26	46	32
X. Of Integumentive System	5		1	6	34		4	11
XI. Of Age	102	135	153	390	697	728	637	682
XII. Of External Causes	87	82	70	239	594	441	292	418
Total of specified causes	1463	1855	2400	5718	10,000	10,000	10,000	10,000
Not specified causes	245	141	64	450				
Still-born	131	138		269				
Grand total	1839	2134	2464	6437				

TABLE XXXII.

Illustrating the Influence of Sex on Longevity in Lowell, since the date of the City Charter, viz., from 1836 to 1848, inclusive.

Years.	Males.	Females.	Unknown.	Total.	Years.	Males.	Females.	Unknown.	Total.
1836	113	140		253	1844	163	196	3	362
1837	140	161		301	1845	171	192		363
1838	203	204		407	1846	331	359		690
1839	157	183		340	1847	442	507		949
1840	186	199	22	407	1848	398	427		825
1841	214	209	11	434					
1842	230	239	4	473	Total	2902	3225	41	6168
1843	154	209	1	364					

TABLE XXIII.

Illustrating the Influence of Season on Longevity in Lowell, since the date of the City Charter, viz., from 1836 to 1848, inclusive.

	Number of deaths in				In each 10,000 deaths, there were in				
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	
	January	126	138	120	384	737	691	487	638
February	-	-	126	141	150	417	737	706	609
March	-	-	144	148	152	444	843	742	617
April	-	-	132	145	157	434	773	726	637
May	-	-	122	155	143	420	714	777	580
June	-	-	87	133	178	398	509	666	722
July	-	-	121	177	263	561	708	887	1068
August	-	-	227	289	431	947	1329	1448	1749
September	-	-	190	232	341	763	1112	1162	1384
October	-	-	159	158	222	539	931	792	901
November	-	-	125	182	168	425	732	661	682
December	-	-	149	148	139	436	875	742	564
Total	-	-	1708	1996	2464	6168	10,000	10,000	10,000
Mean	-	-	142.33	166.33	205.33	514.00	833.33	833.33	833.33

TABLE XXXIV.

Illustrating the Influence of Age on Longevity, in Lowell, since the date of the City Charter, viz., from 1836 to 1848, inclusive.

Years.	Number of deaths in				In each 10,000 deaths, there were in			
	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848	1836 to 1840	1841 to 1845	1846 to 1848	1836 to 1848
Under 1	363	488	458	1314	2153	2448	1859	2153
1 to 2	261	260	311	832	1527	1302	1262	1364
2 to 5	168	216	326	710	983	1082	1323	1129
Under 5	797	964	1095	2856	4663	4832	4444	4646
5 to 10	79	92	131	302	464	461	532	486
10 to 15	52	48	54	154	305	240	219	255
15 to 20	135	137	196	468	790	686	795	757
20 to 30	253	278	417	948	1480	1392	1692	1521
30 to 40	157	199	214	570	919	997	869	928
40 to 50	95	108	134	337	556	541	544	547
50 to 60	72	76	94	242	424	380	382	395
60 to 70	33	40	73	146	193	200	296	230
70 to 80	18	32	35	85	106	160	142	136
80 to 90	8	9	20	37	47	46	81	58
90 to 100	1	1	1	3	6	5	4	5
Unknown	8	12		20	47	60		36
Totals	1708	1996	2464	6168	10,000	10,000	10,000	10,000

TABLE XXXV.

Showing the Population of Lowell at different Periods.

TABLE XXXVI.

Showing the Temperature of the Air in Boston, as indicated by the Thermometer.

	1846.			1847.			1848.		
	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.
January	30°02	49°	1°	29°33	54°	5°	31°85	59°	5°
February	24.68	47	2	29.07	49	5	28.21	46	1
March	39.17	61	9	32.70	51	17	34.70	66	8
April	50.25	83	31	44.11	83	17	46.79	74	30
May	56.17	79	43	58.45	81	37	58.47	88	45
June	64.92	88	54	56.43	92	49	65.90	91	43
July	71.61	96	57	72.57	96	54	70.04	93	54
August	71.26	93	55	68.81	92	54	69.72	92	50
September	67.12	96	47	61.40	85	45	60.02	82	36
October	50.45	80	26	49.70	73	22	50.77	71	34
November	44.19	64	21	44.78	67	8	37.92	56	15
December	29.66	68	11	36.96	65	4	36.70	58	9

TABLE XXXVII.

Showing the Temperature of the Air in Lowell, as indicated by the Thermometer.

	1846.			1847.			1848.					
	Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.			
	Morn.	2 P.M.		Morn.	2 P.M.		Morn.	2 P.M.				
January	19°83	32°94	48°	—4°	19°00	31°39	46°	—1°	19°50	33°31	58°	—10°
February	10.40	30.08	42	—10	19.04	32.71	50	—2	17.16	34.24	46	—2
March	26.76	45.94	63	1	22.27	41.11	52	8	33.81	39.67	66	2
April	37.25	61.09	83	23	32.20	52.92	90	10	36.00	55.67	76	24
May	48.07	66.42	83	32	45.00	64.58	55	32	51.15	68.93	92	33
June	57.80	79.96	96	43	56.58	77.28	100	48	57.00	74.96	95	41
July	62.68	83.73	101	50	62.81	85.77	99	50	62.37	81.65	94	50
August	61.50	83.80	98	49	58.96	80.24	91	50	60.92	82.44	93	49
September	57.19	77.77	99	40	54.34	68.69	89	40	50.26	69.27	84	32
October	41.22	57.85	83	23	38.73	56.35	72	19	41.00	56.19	72	28
November	38.16	47.91	59	26	37.08	49.88	70	5	27.32	42.23	54	12
December	21.77	32.11	46	7	29.74	40.15	64	—3	28.67	36.81	60	0

No available systematic barometric observations have ever been made in Lowell.

TABLE XXXVIII.

Showing the Temperature of the Water, and the Amount of Water which fell in the forms of Rain and Snow in Lowell.

	1846.				1847.				1848.			
	Mean.	Max.	Min.	Inch's water fell.	Mean.	Max.	Min.	Inch's water fell.	Mean.	Max.	Min.	Inch's water fell.
January	32°	32°	32°	2.44	32°	32°	32°	5.42	32°	32°	32°	2.83
February	32	32	32	1.82	32	32	32	3.14	32	32	32	2.10
March	33.22	42	32	3.27	32	32	32	3.46	33.41	40	32	3.54
April	49.54	58	41	1.31	39.34	46	32	2.26	48.29	54	41	1.60
May	60.23	65	56	4.21	54.73	63	44	2.15	58.63	67	51	7.41
June	69.92	76	60	2.40	65.48	75	60	6.75	66.69	74	59	4.01
July	76.27	81	72	3.56	78.81	82	73	3.01	74.12	79	69	2.16
August	77.54	81	71	2.79	74.77	78	73	3.81	74.41	80	68	3.15
September	72.61	82	64	.64	66.44	76	59	4.85	64.58	74	55	4.06
October	55.00	64	45	1.61	52.15	58	42	3.01	51.11	57	46	5.00
November	43.50	47	34	2.70	43.88	48	36	3.70	38.76	48	34	2.68
December	32.15	33	32	1.25	35.92	44	32	4.70	35.12	37	32	3.75
Total				28.03				46.26				42.29

H.—7.

Sanitary Report of Baltimore. By JAMES WYNNE, M.D.

BALTIMORE is a compactly built commercial town, lying on the north bank of the Patapsco river; a short, but bold and wide stream, nine miles above its entrance into Chesapeake Bay, and two hundred miles inland from the Atlantic Ocean. It is partially divided by an inlet, which extends into the town about one and a half miles. On the north side of this inlet, that portion of the city devoted to commerce and shipping is mainly built; but the populous part of the city is gradually extending around the basin at the head of the inlet to its southern bank, which is the eastern termination of the Baltimore and Ohio Railroad, a work intended to connect the Atlantic coast with the great valley of the Mississippi, as well as the outlet for the coal trade of the Alleghany coal basin. From this inlet, which forms a characteristic feature in the scenery of Baltimore, the surface rises toward the north and west into a range of gentle elevations, which extend beyond the town into a series of beautiful and highly picturesque heights, and finally terminate in an undulating country of great salubrity dotted by the country-seats, occupied by the more opulent inhabitants of the city as their summer residences.

Baltimore is nominally divided into four districts, materially differing from each other in general character and population. 1st. *The Point*, so called because the inlet here diverges from the main stream, is the most easterly portion of the city, and commands the greatest depth of water. The greater part of the ship-building and manufactures are carried on here. In addition to the population engaged in these avocations, it is the favourite resort for seamen and newly arrived emigrants, especially the German. 2d. *Old Town* lies between the Point and the city proper, and is principally occupied by mechanics and labourers. 3d. *The City*, so styled, which extends over the undulating surface already described, is the centre of trade, and the residence of the more opulent classes. 4th. *The Spring Garden District* reaches from the head of the inlet to the Patapsco River, including the south side of the basin. It is occupied by mechanics, labourers, and a coloured population. Both the

Point and Old Town have a gentle inclination towards the water, but without a rapid descent. The city, however, which is divided from Old Town by a rapid stream, possesses a very undulating surface, and may truly be said to have been built "over hill and dale." The Spring Garden District, on the contrary, is level and low, as indeed is the whole bank of the river at that point, and is liable, in common with the opposite bank, to remittent and intermittent diseases. From the clay of this district bricks are manufactured, of unsurpassed excellence, in vast quantities, not only for the use of the city, but for exportation, which, by the exposure of a newly denuded surface, and the collection of pools of water, serves greatly to increase the tendency to febrile diseases.

Geological Formation.—The soil on which Baltimore is located consists of clay and sand-hills, covered in many places with a thick coat of gravel. These hills have a north-east and south-west direction, and the adjacent country is marked by short spurs to the south-east with rounded summits, between which its drainage is effected. The soil, with an admixture of lime and plaster, is made quite productive. That consisting of coarse granitic aggregates is ranked as best. It lies upon the upper limits of the great Atlantic arenaceous and argillaceous deposits, resting upon the chain of primary rocks.

Drainage.—From what has already been said, it will be seen that the town, with the exception of the Spring Garden suburb, is admirably adapted, by nature, for surface drainage. Its peculiar facilities consist not only in the undulating nature of its surface, but likewise in the sand and gravel beds which lie beneath, and admit a free percolation of fluid particles. It is traversed by several valleys, coursing in a south-east direction toward the inlet. The outlet for the north-western portion of the city is through Liberty and Hanover streets; but the most extensive valley is that which bounds the City and Old Town, in whose bed flows a rapid, turbulent, and highly useful stream, called "Jones' Falls," which fulfils the purpose of an open sewer to a considerable part of both these sections of the town. Harford Run, a more sluggish stream, flows in a similar direction, and empties itself into the river between the Point and Old Town.

The drainage of the town is under the control of the city commissioners, who are not at liberty, however, to project new works without the direction and assent of the common council. There being no public survey of levels, the grades are far from regular. The principal inconvenience arising from this source at present, is

not the inability of the surface drains to carry off the water, but the unnecessary, and frequently injurious accumulations of it in certain localities during violent showers. It is the opinion of those best informed on this subject, that a general survey of levels would not have attained the object more *effectively*, but more *conveniently* than at present. The grades of the streets are extremely variable, the lowest being one inch, and the highest fourteen inches, in ten feet. All the streets are paved, and supplied with gutters on either side, at the cost of the property holders. As the improvements advance, they are anticipated by grading and paving the streets, with an especial eye to surface drainage; and as in a greater part of the town this is the only mode of draining, an inability to perform that office would be looked upon as a *nuisance*, and redressed. The grades are regulated by the city surveyor, and it is presumed no new streets are laid out, where every advantage the nature of the surface will admit of, is not taken to effect this object.

The arrangements for under-ground drainage are very meagre, the aggregate of all the sewers not exceeding two miles in length. They are usually constructed near the streams in which the outlet for surface drainage is sought, to overcome some slight rise of surface; and as the distance is short, and the flow of water usually abundant, a very defective structure is frequently found to answer the purpose. The sewers usually have an arched roof of mason work, but a flat bottom, frequently made of timber instead of masonry. It is manifest that a sewer thus defective could not be made efficient, except under the most favourable circumstances, and their success is rather an argument in support of the favourable position of the town for drainage than an evidence of their excellence. It is a singular fact that the most defectively drained district skirts along Jones' Falls, where the facilities for drainage are very great; and a stranger passing from the clean and well-washed streets in the upper part of the city, into this district, loaded with filth, and giving off the most offensive exhalations, would hardly believe himself in a district under the same municipal regulations. Harrison and Frederick streets, and the lower part of Saratoga, are examples of the correctness of this assertion.

Floods.—Jones' Falls has, on three different occasions, overflowed its banks, inundating the first stories of the houses in its vicinity, and in two instances reaching to the second, doing great damage to life and property. It was supposed that the abutments of the numerous bridges which crossed it, by checking the floating matter carried down by the mad current, and thus forming dams, increased

the volume of the stream to such an extent as to cause its overflow. These abutments have since been removed, and the bridges now span the stream by a single lofty arch. No flood, fortunately, has since occurred to test the reliance to be placed on this measure. It appears, however, adequate to the end proposed.

Street Cleansing and Nuisances.—The scavenging of the city is placed under the control of the Board of Health, a portion of whose duty it is to see that the streets are kept in a proper condition. At present, the town is divided into five districts, let out to separate contractors, each of whom is bound by a penalty to keep his district clean. The aggregate amount paid by the city for this duty is between six and seven thousand dollars, and the street refuse, which is looked upon as the most valuable part of the remuneration. There is no fixed time for cleansing the streets, and they receive attention in proportion to their tendency to accumulate filth, but never more than twice a week, more frequently once in two weeks. The narrow lanes, inhabited by the poor, although more liable to become filthy, receive less attention than the more public thoroughfares, and are always in a more dirty condition. It may be proper to remark that the refuse of the streets is not collected together by brooms, but is gathered into heaps by hoes, and carted away. The most effectual scavenger is a copious shower, which, from the rapid descent of the streets, sweeps away with it an incredible amount of street washings. These showers are very frequent during the summer months, and are always hailed by me as a great blessing, on account of the manner in which they purify the streets. There are no regular depots for the street manure, but each contractor deposits the manure from his district on such vacant lots as he can obtain in the outskirts of the town, until disposed of to the surrounding country people, or carried away in boats.

The courts are under the jurisdiction of the police, who require the owners to keep them clean; but as there is no regular system adopted, they frequently become not only offensive, but foci of disease. They may be reported to the Board of Health as nuisances, when in this condition; but when it is considered how unwholesome an atmosphere the inhabitants of a populous town will bring themselves to tolerate, it is not a matter of surprise that they frequently freight the air with unhealthy emanations for months together before becoming a source of complaint. I remember being called to visit a poor female, under the charge of a midwife, in an extremely difficult case of labour, in a narrow court, very near to my own residence, and immediately behind the residences of several of the most

fashionable families of the city. The only ingress for air into the court, which was surrounded by the high houses on the outer side of the square, was by means of a narrow entrance, immediately adjoining which was a large piggery, constantly emitting the most offensive exhalations. The air of the whole court was close and oppressive, and although I had the good fortune to leave my patient safely delivered, I predicted in my own mind the death of her infant, from the want of wholesome atmosphere, which event was realized a few weeks after. I had occasion to observe, that out of a population of about fifty persons inhabiting this court, several deaths took place within a few weeks. The most surprising feature of this case is, that the wealthy inhabitants, surrounding the square, should be so little conversant with the actual condition in which they lived as to be content to inhale the noxious emanations from this confined court.

My decided conviction is, that the superficial street cleansing to which the city is now subjected, does not reach the evil it aims to overthrow; and that nothing short of a careful sweeping of every part each day, *including the narrow courts and alleys where it is most needed*, will accomplish this object.

Public Nuisances.—An important nuisance is found in the refuse animal and vegetable matter, deposited by the inhabitants of the small courts and alleys in them during the night. There is a city ordinance against thus disposing of the refuse of the kitchen; but those who pass through the lanes of the town have abundant testimony to prove its disregard. This refuse, when not eaten by the swine, which are fortunately permitted to perambulate them at their pleasure, remain subject to the influences of decomposition until the streets are again cleansed; and as these lanes are never entered by the scavengers more than once a week, it is not unusual for decomposing matter to remain in them for several days—sufficiently long to generate all its noxious properties, and vitiate the atmosphere of the whole neighbourhood in which it is situated. The remedy for the removal of this important nuisance is sufficiently obvious, and consists: 1st. In sending carts into every part of the city once each day, to collect the refuse brought to them from the houses; and 2d. In submitting the streets to a thorough sweeping once every day.

Each house, however humble, is provided with a privy supplied with a pit, enclosed with a brick wall in hydraulic cement. These pits are cleansed whenever they require it by the night-men, who dispose of their contents for manure. In the better class of houses

the patent water-closets are in very general use. In these, the excrementitious matter is carried by a jet of water through a soil-pipe, but finally finds its way into the pit, and yet remains undisposed of. I have recommended to several architects to carry these soil-pipes beneath the ground for some distance until they meet a bed of gravel, freely traversed by a subterranean stream of water, which can always be found beneath the city, and thus permit it to be diffused. The practicability is admitted, but, owing to the additional expenditure, it has never been carried into operation.*

Slaughter-Houses.—No new slaughter-house is allowed within the limits of the city, and those already erected are usually associated with each other. I am strongly of the opinion that the city should possess one slaughter-house under its immediate supervision, situated some distance from the populous parts of the town, and subjected to a rigid surveillance, where everything exposed for sale by the butchers in the market should be killed. The offensive matters might, by this means, be judiciously disposed of, and, at the same time, a scrutiny exercised to ascertain that no animal was killed, whose meat was not in a proper condition to be eaten.

Manufactures.—The smoke and offensive fumes from different manufactories in various parts of the town, may likewise be included among the nuisances. Of these, the glue and poudrette manufactories stand foremost. In addition to these, soap establishments, and gas, chemical, and white-lead works, are prominent.

Burial-Grounds.—There are numerous burial-grounds within the populous part of the city; but the number of recent interments in them is comparatively trivial. Green Mount Cemetery, situated about two miles from the centre of the town, and comprising a space of upwards of one hundred and fifty acres, rendered extremely picturesque by nature, and highly improved by art, is now the great receptacle for the dead of the better classes, and Potter's Field for those in a more humble condition. It is difficult to induce the inhabitants of an increasing town to look very far beyond their present wants, and distant as Green Mount Cemetery now appears to be from the populous part of the town, it is easy to foresee that not many years will elapse before it will be surrounded by a dense population.

* Since writing the above, I have seen several successful attempts made to carry off the soil in the manner indicated. Water has usually been reached at a depth of about twenty feet.

Want of Sewers.—The absence of a complete system of underground sewerage, constitutes an important nuisance operating in all parts of the town, but most severely in the low, level, and uncleanly portions occupied by the poor. The appropriations for the present year for building sewers, have been more extensive than any previous one, and should a registration-bill pass the council, pointing out which are the unhealthy parts of the city, I make no doubt but that this much neglected subject would receive the attention it merits. Harford Run, which receives an immense amount of animal and vegetable deposit, and which has too sluggish a stream to carry it into the river, is a fruitful source of fever. An ordinance for tunneling this stream passed the city council at its last session.

Water.—Baltimore is supplied with water in part by an incorporated company, called the Baltimore Water Company, and in part by pumps and public fountains. The pumps and public springs are under the control of the city commissioners, who erect a new pump at the expense of the property holders, whenever eight of them residing in the vicinity of the proposed pump join in a petition for that purpose. There are several public fountains enclosed in small public squares, and tastefully ornamented in various sections of the town, supplied by springs. The pump water is offensive to the taste, and extremely hard, with a few exceptions. It is, therefore, seldom made use of by those who can supply themselves with the water company's water.

This company was chartered in 1808, and obtains its supply of water from Jones' Falls, some distance above the town. This stream derives its origin from innumerable springs, taking their rise in the elevated slate region, north of the town, and passes with a very rapid descent over a rocky bed through an exceedingly romantic limestone valley. This water, which is pure and soft, is not only agreeable to the taste, but is well adapted to all household purposes. As an evidence of its purity, the dyers find no difficulty in fixing the most delicate colours with it.

The company have two reservoirs. One, fed by the flow of the stream; and the other, by pumps. The lower reservoir, or that fed by the flow of the stream, was built in 1846, and is capable of holding fifteen millions of gallons. This reservoir is intended to supply the lower portion of the city on all occasions; and, at the same time, when the necessity occurs, to give a portion of its contents to the upper reservoir. The upper reservoir was built in 1838, and holds three millions of gallons. The water is raised into this reservoir ninety-five feet, by means of two pumps, of twelve and three-

fourth inches bore, and six feet stroke, and worked by one water-wheel of sixteen feet diameter. It requires the waste of eleven gallons of water to raise one into the reservoir; and, in order to provide against a scarcity, an engine is at hand to work the pumps. The mains are laid down in about one-half of the populated portion of the city, and are being extended daily to such sections as will pay an interest on the expenditure. The mains at the reservoir are eighteen inches in diameter, and decrease as they recede to sixteen, twelve, ten, eight, six, four, and three inches. These mains were formerly of wood, but since 1820 they have been made exclusively of iron.

The service-pipes are exclusively of lead, which metal has been in use by the company since 1820. About five thousand houses are supplied with hydrants, and the use of the water is unlimited. The daily consumption in summer varies from five hundred thousand to one million gallons, but is considerably diminished in winter. For the prevention of fires, there are one hundred and fifty fire plugs, and a full head of water is kept on in all the mains, so that it can be obtained as soon as the hose is attached. The city provides no free hydrants for the poor.

The company conceives its ability undoubted to supply an entire city, twice as large as Baltimore, with an unlimited quantity of water. Should, however, its resources, in time to come, not be equal to the wants of the population, the city has, in its vicinity—Gwynn's Falls—a stream whose capacity in the dry season would enable it to furnish upwards of ten millions of gallons in twenty-four hours, flowing from the same region, and possessed of the same qualities, which can be diverted into a reservoir by the natural flow of the stream on the heights overlooking the town, at an elevation of 185 feet above tide water, at an estimated expense of not more than half a million of dollars.*

It may be proper, in looking to the prospective demand for an additional supply of water for the city, to mention that very extensive and accurate surveys were conducted by John Randel, Jr., Esq., of all the eligible streams in the neighbourhood of the town in 1835, under the direction, and at the cost of the city government.

In Mr. Randel's report, laid before the councils, April 21st, 1836, he gives a decided preference to the Great Gunpowder Falls, which, according to an accurate gauge made by him in the driest season, is capable of yielding sixty-four millions, ninety-three thousand and ninety-one wine gallons of water every twenty-four hours.

* Report of the Water Committee to the City Council in 1829. The increased value of mill-seats on this stream in twenty years would probably now double the estimate of the committee.

Across this stream, which was to be directed into the city, from a distance of twelve or thirteen miles, "A dam is to be built," says this report, "near Tyson's (formerly Jessup's) mills, and another dam across the western run, near the York turnpike. These dams are to be connected by an aqueduct, and this aqueduct is to be continued across the valley of the Beaver dam, to the high ground or hill of limestone rock, lying between a branch of Jones' Falls south of Timonium, and a branch of Beaver Dam, near Cockey's. This hill or rock is to be cut down to such a depth, as will permit the water to be carried by an aqueduct from a point from ten to twenty feet below the level of the top of this dam, on a descent of about one foot per mile to and through that deep cut, and thence along the west slope of Jones' Falls Creek to an ample reservoir, to be provided in the vicinity of the city of Baltimore." This reservoir would have been three hundred feet above tide water. Although this work would have exceeded that of Gwynn's Falls in cost, by at least half a million of dollars, it is probable that it might have been constructed, but unfortunately a difference ensued between Mr. Randel and the city government, which resulted in his withdrawing his surveys, and their abandonment of the project.

The following prices are demanded by the company for the use of its water:—

"*Charges for Hydrant Water.*—Private family, \$10 per annum, payable half yearly in advance; private family, in houses less than seventeen feet front, \$8; boarding-houses, \$10 to \$50, do.; steam engines, \$10 per horse power, do.; baths, \$3 per annum, payable in advance; horses, \$1 50 do.; carriages, \$2 do.; water-closets, \$3 do. Hotels, factories, and others, as per agreement with the company.

"All persons using the hydrant water for any of the above purposes, without the knowledge of the company, or permitting their neighbours to use the water, without a written permit from the company, will be charged double the above rates, and the water discontinued. No person will be permitted to introduce the hydrant water for any of the above uses without a written permit from the company; in case of discovery, the water will be stopped, and the connection cut off."

Lead Pipes.—The subject of lead pipes has lately attracted much attention in Boston, where the matter was fully investigated previous to their adoption, in distributing the Cochituate water, recently introduced into that city. The result of the investigations, conducted under the superintendence of Professor Hosford, has re-

cently been published in the Report of the Water Commissioners, and sets the question, in my opinion, finally at rest. From this report, it appears that no evidence of disease from lead has yet been detected in the cities of London and Paris from the use of the hydrant water, although that material is in universal use in both of these cities as service pipes.

Professor Hare, of Philadelphia, Professor McNaughton, of Albany, and Dr. Brinsmade of Troy, New York, all bear testimony to the same fact, although the lead for service pipes has long been used in each of these towns. Professor Hubbard, of Dartmouth College, states that the village has been supplied for twenty-six years with water conveyed two miles in lead pipes, and that he has never heard of a case of lead poisoning from its use.

Dr. Dana, in an appendix to his translation of the work of M. Tanquerel, on lead diseases, recently published, has furnished a very strong argument against the use of lead pipe, which, in the absence of the positive testimony furnished by the Boston Water Commissioner's Report might go far towards banishing it from use. In his remarks on the specimens of Baltimore and James River pipes, examined by him, he says that he observed slight cribiform erosion, and adds: "But this is evidence that so slight an action could not have been sufficient to produce erosion in a few days. It may be inferred to have gone on for years." Since the appearance of Dr. Dana's work, I have examined numerous specimens of lead pipe, which had been long in use in Baltimore, some, upwards of twenty-five years; and, although I have anxiously sought for some evidence of the slight erosion mentioned in Dr. Dana's work, I have not, in any instance, been able to detect it. I therefore, conclude that the erosion, in the specimen examined by him, was due rather to some original defect in the texture of the metal, than in the action of the water upon it. The interior of the pipe was always found thickly coated with an earthy deposit, which adhered with such tenacity as to require considerable force, and much washing to remove it; and, in my judgment, formed a considerable protection to the water against the action of the lead, admitting its capacity to unite with the water, which did not appear, from any evidence furnished by the pipe itself.

I have met with several cases of disease from lead among workmen engaged in its manufacture since my residence here; but have never observed any lead disease which might be attributable to the use of the hydrant water. Within a few weeks, the pipe of the hydrant attached to my own residence was removed, and its place supplied by a new one at least sixty feet in length, and although

the water was used soon after, I could not learn that any member of my family experienced the slightest injury from it.

Fires.—From the report of the joint committee of the Common Council, it appears that the organization of the fire department is purely volunteer, that there are seventeen fire companies, embracing in all about four hundred members. No compensation is allowed them for this service; nor exemption from the duties incumbent on all citizens. The city, however, appropriates a small sum annually to enable each of the fire companies to keep its apparatus in order.

The number of fires which have occurred for a few years past are as follows:—

	Alarms.	False.	Chimneys.	Fires.
In 1841	258	84	36	138
“ 1842	297	86	51	160
“ 1843	302	82	66	154
“ 1844	232	84	22	126
“ 1846*	238	76	33	129
“ 1847	385	76	51	258
“ 1848	410	146	41	223

Building and Ventilation.—The municipal authorities are vested with power to regulate the erection of new buildings, which must conform, in materials at least, to the existing city ordinances. The object of these ordinances being to protect from fire, and to prevent the closure of open thoroughfares, they do not attempt to interfere with the peculiar tastes of the landlords who erect them. The houses occupied by the labouring classes usually have a front of sixteen, and a depth of thirty feet, are two or three stories in height, and invariably built of brick. Behind the main building, in most instances, is a back building of the same height, and a yard with a privy and hydrant. These houses are for the most part occupied by one family; but they are sometimes under-let in rooms to poor persons. The system of a number of families occupying the same house, does not prevail to the same extent in Baltimore as in some other places, and is confined to the *very poor*.

Whole streets, however, in the worst parts of the town, are occupied by a wretched population, crowded together in the most unseemly and unhealthy manner.

Stoves for warming are in almost universal use among the labouring population, and the one known by the name of “*ten plate stove*,” which answers for cooking as well as warming, appears

* No report was kept in 1845.

to be in greatest demand. The fuel consumed by the poor is principally wood. As the winters are usually mild, and liberal provision is made for the gratuitous distribution of fuel to the poor during the cold season, the want of it is not severely felt.

The streets are generally laid out in such a manner as to intersect each other at right angles, and are from thirty to seventy feet in width. There are numerous courts and alleys, however, built up within the squares less than fifteen feet in width, which are very imperfectly ventilated. These narrow alleys, which are unfortunately frequently densely populated with the most improvident and miserable inhabitants, are, in some instances, shut out effectually from ventilation by the erection of a building across the outlet of the alley. There are certain portions of the town, built at an early day for other purposes, which do not answer to the description already given. As an example, in that part bounded by Light and South streets, and extending from the Pratt street basin several squares backwards upon a marshy soil, the streets are very narrow and irregular, and the dilapidated houses, inhabited by numerous families, are filthy and offensive in the highest degree. Fortunately, such localities are not numerous. But why allow them to exist at all? The cupidity of landlords should never be able, in a well-regulated town, to furnish the means of generating pestilence and death; cellars are scarcely ever occupied as sleeping-rooms, and few families live in them altogether.

Ventilation.—But little attention is paid to ventilation, either in private buildings or public edifices, although occasionally instances occur among the recently erected residences of the more wealthy, which are deservedly admired for their beauty, where all the requirements for complete ventilation are present. Every one is aware that constant breathing is necessary to sustain life; but few reflect that nearly thirty thousand respirations take place every twenty-four hours, requiring six hundred cubic feet of air. One of the most prolific sources of mortality in cities, is the vitiation of the atmosphere by crowding large masses of human beings together. Sir James Clark observes, that “If an infant, born in perfect health, and of the healthiest parents, be kept in close rooms in which free ventilation and cleanliness are neglected, a few months will often suffice to induce tuberculous cachexia.” It is precisely in those places where destitution is greatest, and mortality highest, that defective ventilation prevails. In addition to exhalations from drains and decomposing refuse, which contaminate the air from without, the poor, in their economy of warmth, close up all the

avenues in their power by which its ingress or egress is effected. In proportion, also, as the body becomes enfeebled by disease, is it rendered sensitive to currents of air; and hence those whose circumstances enable them to command comforts, are fain to dispense with a sufficient supply of wholesome atmosphere to preserve the integrity of the system. With the view of furnishing a perfect change of atmosphere to sleeping apartments, I have invented a stove, which contains a chamber for heating air, brought from without, and pipes to diffuse it through the apartment. By means of this apparatus, which is exceedingly simple and economical, for introducing air, and a valve to allow the impure air to escape into the flue, at the upper part of the room, the apartment can be kept perfectly ventilated. To a consumptive patient, who requires a fixed temperature, and, at the same time, a change of atmosphere, such an apparatus appears to me invaluable.

Public Squares.—There are several public fountains in different parts of the town, within inclosures of three or four acres in extent; but, with these exceptions, Baltimore is destitute of public squares, nor do the public authorities yet appear to appreciate the advantages incident to their establishment in a large and increasing town. Several holders of vacant lands within the city limits, with a view to enhance the value of their property, have offered public squares to the city. Two of these, Franklin and Union Squares have, after much difficulty on the part of the city authorities, been accepted. In order to demonstrate the little value in which public squares have always been held by the city government, I have but to mention that immediately after the completion of Washington's Monument, which occupies a position in one of the most elevated and fashionable parts of the city, the proprietor of the adjacent lands, which were then vacant, offered the city a public reservation of one hundred acres surrounding the monument in all directions, to be beautified as a public park for a mere nominal sum, which it declined accepting, seeing no advantage that could possibly result from such an appropriation of land within its limits; and this exquisite contribution to architecture, now rears its beautiful and lofty proportions amid a mass of houses instead of the waving elms and towering oaks that once adorned the summit which it crowns, and which would have furnished such an agreeable relief to the monument itself, and have been productive of such vast advantages to the morals and health of the inhabitants of the city.

It is to be hoped that the day is not far distant when Baltimore will appreciate the immense advantages to be derived from public

parks, and will make provision for their creation and maintenance, on a scale of magnificence commensurate to the wants of its inhabitants. The evil does not reside in the tastes of its population, especially its lower classes, who seek recreation of this sort with avidity whenever it is offered to them. Green Mount Cemetery became so favourite a resort for the citizens of the town, that the proprietors felt themselves obliged (whether wisely or not, I do not pretend to say) to shut their gates against those who sought recreation from their confinement and labours, in the midst of its rich foliage and pleasant shady walks.

Surely those whom Providence has consigned to wearisome labour, in wretched homes, over which disease and mortality hang like a pestilential vapour, have a right to some consideration at the hands of municipal authorities; and with the facts which our tables of mortality present, that one-half of our population die before they have reached their fifth year; and that within the last year, *the number of deaths to the living was as one to thirty-six*, a mortality almost equal to the most unhealthy manufacturing districts in Europe; it would be idle to say that every necessary thing had been done to alleviate the wants of that helpless, but interesting portion of the community. If the fearful miseries entailed by excessive mortality were irreclaimable, it might be prudent to bow our heads to the storm which is wasting its fury upon our poorer population; but it is an indisputable fact, which recent inquiries have fully demonstrated, that these evils are susceptible of almost entire removal, by an expenditure of less money than their existence entails upon the community. The amount contributed to the improvement of general health, and public morals, however large it may be, is only so much taken from the fund which would otherwise be expended in the maintenance of pauperism.

Public Baths and Laundries.—The subject of baths for the poor has not attracted attention in Baltimore, and there are no public establishments of this sort. That they would be of advantage here, as elsewhere, is very evident; indeed, an appendage to a fashionable house is invariably a bath-room; and I am extremely cautious in advising those families, whose professional adviser I am, wherever the means are at hand, to bathe frequently, as one of the most powerful promoters of health. If frequent ablutions are of such importance to those who are surrounded by the appliances of luxury, of how much greater value do they become, to those less favoured in their condition? The labourer or poor mechanic is unable to pay a large sum for a bath, and yet would gladly avail himself of one for himself

and family, if brought within his reach. The beneficial result of ablutions is strikingly manifested in the practice of lead establishments, where the proprietors require their workmen to wash their hands and face carefully before leaving the workshop. By this simple precaution, they are enabled to make an unhealthy occupation comparatively healthy. That uncleanness and mental degradation are intimately associated with each other, is now generally admitted; hence, in proportion as the body is kept cleanly, are the moral faculties elevated, and the tendency to commit crime diminished.

Public Schools.—The public schools are placed under the supervision of a board of school commissioners. The number of schools in operation, during the year 1848, appears, by the report of the commissioners, to have been twenty-five, of which eleven were male, and fourteen female schools. One of the male and two of the female are devoted to the higher branches of public instruction, and are termed high schools; the remainder are appropriated to the instruction of the elements, and are termed primary schools. The buildings occupied as public schools usually consist of a main story, and a basement beneath, either on a level with the ground, or more or less sunk beneath the surface. Both of these stories are occupied as school-rooms. The number of scholars in attendance last year was six thousand six hundred and ninety-nine, being about two hundred and sixty pupils to each school. The rooms occupied by these two hundred and sixty pupils, are about forty-five feet long, thirty-five feet wide, and from twelve to fifteen feet in height. They are, with the single exception of the male high school, defective in ventilation, and are universally heated by stoves. In some of the schools, no attempt, whatever, has been paid to improve their ventilation; in others, an effort has been made to remedy the evil by a few holes perforated in the ceiling; but in no instance that I am aware of, has a building been provided with properly constructed flues for the escape of the foul air, and the introduction of pure atmosphere in its stead. The consequence is, that the air, in a very short time, becomes insupportable, and the teachers are obliged to lower the upper sashes of several of the windows, in order to procure a partial relief. It is obvious to any one at all acquainted with the principles of ventilation, that, whilst the currents of cold air, from the windows, expose those near them to disease, they signally fail to effect a change in the atmosphere of the apartment. It may be proper here to remark, that whenever a large quantity of cold air is intro-

duced into an apartment bearing an elevated temperature, by means of a window, its tendency is to assume a local movement, which prevents its extensive diffusion, unless broken by some mechanical obstruction, which it is the great object of ventilation to promote. I have paid repeated visits to a number of the public schools, and invariably found them loaded with an atmosphere so unpleasant as not only to be sensible to myself, but painfully manifest to the teachers, who universally complained of headache, after two or three hours' confinement. Now, when it is taken into view that an atmosphere, fresh at the commencement, and deteriorated slowly, may not be sensible to the persons confined in it, and that, therefore, the unwholesomeness manifest to the senses of a person newly entered, may not be perceptible to the teacher, it will readily be admitted, that the amount of impurity complained of was neither light nor trifling. From the number of persons crowded together in one apartment, the age of the pupils, and the length of time spent in them, there are no places more liable to a vitiated atmosphere than public schools; and for the reasons just mentioned, there are no places where greater care should be taken to prevent the operations of a cause, which impedes the functions of respiration, relaxes the body, and enervates the mind, so as to render the slightest exertion, either corporeal or mental, tiresome and irksome in the highest degree.

In addition to the schools under the care of the commissioners, the Brothers of the Christian Schools, the Brotherhood of St. Patrick, and McKim's free school, give schooling to about two thousand pupils. The remarks applicable to the public schools will generally apply to them.

Vital Statistics.—In presenting the accompanying tabular statements, I have to remark that the bills of mortality are issued by the Board of Health, and are made upon a weekly inspection of the registers kept by the sextons of the different graveyards. These registers, which contain all the information at the disposal of the Board of Health, are made of such information as the sextons can most readily command, and are, therefore, far from being reliable sources, so far as the particular diseases are concerned. The number of interments is probably accurately stated, and an approximation to age obtained; but beyond this, very much uncertainty prevails.

Table B presents the actual mortality which has taken place in each of the last thirteen years, and exhibits a fluctuation from the

exceedingly favourable standard of less than one in fifty (1840), to an extremely unfavourable one of one in nearly every thirty-six inhabitants (1848). The table, showing the causes of deaths, exhibits the greatest fluctuation in these years in scarlet fever; the number in 1840 being only 71; and in 1848, 407. An examination of the table, exhibiting the ages at which deaths have taken place, would appear to confirm the correctness of the table of diseases, by showing that the infantile period on which scarlet fever makes its heaviest demands, was really freer from mortality in 1840 than in the years preceding or succeeding it. It would be unsafe, however, to reason upon causes of disease, which were not attested by the medical men in attendance; but even were I to assume the correctness of the causes of death as manifested in table D, there would still be wanting very important elements, in order to make this information practically useful.

From my own observation, independent of the bills of mortality, I am enabled to state, that during the latter part of the year 1847, and the first part of 1848, scarlet fever was not only more prevalent in Baltimore than for a number of years previous, but was marked by a great fatality. Epidemic scarlatina commenced about August 1847, and subsided about May 1848; after that period the number of cases not only diminished very rapidly, but those which did occur, for the most part, yielded easily to medical treatment. In July and August of 1848, cholera infantum, a disease much more dependent upon a vitiation of the atmosphere than is generally supposed, and which is always a terrible disease in our large cities, especially among the poor, appeared to me to be more than usually fatal, and prevailed more extensively among the children of the better class of inhabitants, than I had hitherto observed it.

These tables furnish evidence, however, that Baltimore, in common with the other large cities of the United States, is subject to a much higher rate of mortality than the surrounding country. The reason for this increased mortality becomes, in this connection, a very important sanitary inquiry. That meagreness of diet occasionally induces unhealthiness and mortality in individual instances in our cities may be true; but I apprehend that, as a general rule, while the labouring classes in town perform less severe labour than those in the country, they are supplied with an equal, if not greater, amount of substantial food. One prominent and just cause assigned for this disparity, is the extreme vitiation of the air in cities from a

great variety of causes. In the performance of the act of respiration, by man and the animals congregated for his use, an immense amount of impurity is constantly being given out to the atmosphere, in addition to which, the products of the innumerable fires and gaseous effluvia from manufactories, seem still further to increase this evil; besides which, even where cleanliness is not entirely overlooked, a large amount of decaying vegetable and animal matter must necessarily be present, loading the air with its noxious gases, so prejudicial to health. Where, by a dense accumulation of improvident persons, such as occurs in the most humble quarters of a populous town, these evils are increased by uncleanliness, and an almost entire want of ventilation, typhoid fever and other diseases are rapidly generated; which not only scourge the quarters in which they emanate, but frequently extend with alarming rapidity from these wretched purlieus of misery to the more wholesome and better ventilated portions of the town. The system of sewerage, for the purpose of removing the refuse of the houses, is unknown in Baltimore. Carts are not sent around for this purpose, and the streets from necessity become the depositaries for much of the offensive matter from the kitchens. The consequence is, that in many of the narrow courts and alleys, rarely visited by the scavengers, the atmosphere is constantly surcharged with the most unpleasant, and not unfrequently noxious effluvia.

Another important element in the production of disease, is a concentration of population among the poor. This can never take place without proportionally increasing the rates of mortality, and it has invariably been found to hold good in those places where the bills of mortality are so kept as to elucidate this inquiry, that high mortality and over-crowded population go hand in hand. Our bills of mortality furnish no means of designating the healthy from the unhealthy parts of the town. But it is no matter of surprise, where buildings and courts, with defective ventilation, surrounded by the effluvia of decomposing matter without sewerage, and crowded by a population subjected to the evils of poverty, exist, that the air should be freighted with pestilence, and life wither prematurely away under these destructive influences.

TABLE A.

Population of Baltimore, showing the Sex, Age, and Colour of the Inhabitants, as exhibited by the United States Census of 1840.

CLASS OF POPULATION.	Under 5 years.	Males					Females					Total population.
		5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	
Whites. { Males	6350	4498	3926	4212	8536	5721	2961	1552	764	238	70	10
{ Females	6220	4623	4316	5172	9465	5544	3279	2068	1098	389	108	18
Total	12,570	9121	8242	9384	18,001	11,265	6240	3620	1862	627	178	9
Free blacks. Males	2170	1825	1601	1287	369	9	Fem.	2254	3092	2731	1861	30
Slaves. Males	281	505	231	113	35	4	"	364	946	453	206	61
Total	2451	2330	1832	1400	404	13		2618	4038	3184	2067	799
												102,513

TABLE B.

*BALTIMORE.—Deaths, Population, and rate per cent. of Mortality for thirteen years, 1836—1848, inclusive.**

Year.	Population.	Annual mortality.	Mortality, one to every	Per centage of mortality.
1836	93,919	2192	42.75	2.33
1837	95,266	2518	37.80	2.64
1838	97,547	2476	39.39	2.53
1839	99,985	2260	44.23	2.26
1840	102,513	2045	50.12	1.99
1841	105,087	2247	46.76	2.14
1842	108,233	2477	43.29	2.31
1843	112,021	2333	48.01	2.08
1844	116,501	2665	43.71	2.28
1845	121,161	2896	41.81	2.38
1846	127,219	2996	42.45	2.35
1847	133,579	3414	39.12	2.58
1848	140,457	3861	36.19	2.76

TABLE C.

*BALTIMORE.—Deaths, Population, and Mortality of Coloured Population for nine years, 1840—1848, inclusive.**

Year.	Population.	Annual mortality.	Mortality, one to every	Per centage of mortality.
1840	21,192	480	44.15	2.26
1841	21,615	583	37.07	2.69
1842	22,047	641	34.39	2.90
1843	22,487	562	40.01	2.49
1844	22,936	590	38.87	2.59
1845	23,394	676	34.39	2.90
1846	23,861	699	34.02	2.93
1847	24,338	694	35.34	2.82
1848	25,068	840	30.00	3.33

* Exclusive of stillborn.

TABLE D.

BALTIMORE.—*Statement of the Causes of Deaths for thirteen years, 1836—1848, inclusive.**

	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	
Abscess - - -	-	2	4	1	2	4	2	4	1	1	1	4	2	
Affection of the nerves - - -	-	-	-	-	-	-	-	-	-	2	1	-	1	
Amputation - - -	-	-	-	-	-	-	-	1	-	-	-	1	1	
Aneurism - - -	-	1	-	-	1	-	1	-	-	-	-	-	-	
Apoplexy - - - produced by violence	-	22	20	25	29	25	19	22	17	23	15	28	22	19
Arthritis - - -	-	-	-	-	-	-	-	-	-	1	-	-	-	
Asthma - - -	-	16	4	6	6	8	6	1	1	12	2	3	3	2
Bite of a spider dog - - -	-	1	-	-	-	-	1	-	1	1	-	-	-	
Bronchitis - - -	-	-	-	1	-	2	5	4	5	6	5	11	8	8
Burn - - -	-	11	11	16	11	14	9	7	7	9	13	8	12	17
Cancer - - -	-	9	9	11	7	10	8	9	12	17	12	20	17	10
Carbuncle - - -	-	-	-	-	-	1	-	-	-	-	-	-	-	
Carditis - - -	-	-	-	-	-	-	-	1	-	-	-	-	-	
Catarrh - - -	-	-	-	-	-	1	-	-	-	-	-	-	-	
Casualty - - -	-	31	28	33	24	20	27	55	21	27	37	37	34	39
Chicken-pox - - -	-	-	4	2	1	3	1	-	-	-	1	1	-	
Child-bed - - -	-	18	29	28	21	20	31	14	21	29	34	36	35	62
Cholera - - -	-	-	-	-	-	-	-	-	-	1	-	-	-	
Cholera infantum morbus - - -	-	191	131	199	125	114	194	198	159	129	113	139	249	244
Cholic - - -	-	2	-	2	2	1	-	9	8	7	7	4	9	9
cramp - - -	-	6	9	4	3	7	4	4	10	4	12	8	4	6
biliary - - -	-	3	8	3	4	4	4	1	2	-	5	3	1	6
painter's - - -	-	-	1	-	-	-	1	2	-	-	-	-	-	
Concussion of the brain - - -	-	-	1	-	-	-	1	-	-	-	-	-	1	2
Congestion of the brain - - -	-	-	-	-	-	-	3	1	3	-	1	3	2	1
lungs - - -	-	-	-	-	-	-	1	-	1	-	1	-	-	
bowels - - -	-	-	-	-	1	-	-	-	-	1	-	-	-	
Constipation - - -	-	-	1	-	-	-	-	-	-	-	-	-	-	
Consumption - - -	-	316	396	410	397	359	454	480	483	510	523	548	590	620
Contusion - - -	-	2	1	2	1	-	-	-	-	1	-	-	-	
Convulsions - - -	-	86	85	89	65	55	84	83	57	73	81	73	81	106
Coup de soleil - - -	-	-	-	3	-	-	2	-	-	-	1	1	1	2
Croup - - -	-	47	59	45	51	31	26	42	71	56	80	91	127	165
Death from blows - - -	-	2	6	1	-	1	3	1	2	1	1	6	-	-
by lightning - - -	-	-	-	-	-	-	1	-	1	-	-	1	-	-
from stabs - - -	-	-	5	1	-	1	-	-	2	2	-	3	-	-
violence - - -	-	-	-	-	1	2	1	1	1	2	-	2	2	2
Delirium tremens - - -	-	-	-	-	-	-	-	-	-	1	-	-	-	
Diarrhoea - - -	-	2	-	-	1	-	-	2	-	1	-	-	7	15
Disease of the prostate gland - - -	-	-	1	-	-	-	-	-	-	-	-	-	-	
spine - - -	-	1	3	3	2	8	3	3	9	3	10	8	3	5
throat - - -	-	-	-	-	-	-	-	-	-	3	-	-	4	1
womb - - -	-	-	-	-	-	-	1	1	-	-	1	3	2	1
Dropsey - - -	-	50	50	63	60	57	49	44	42	58	44	62	72	79
in the head - - -	-	34	34	43	26	63	64	47	55	50	46	39	-	-
Drowned - - -	-	25	39	23	35	22	27	26	24	27	34	40	34	31
Dysentery - - -	-	25	39	25	16	27	22	25	22	11	13	7	42	46
biliary - - -	-	-	-	-	-	-	-	-	2	-	-	-	-	
Dysmenorrhœa - - -	-	-	1	-	-	-	-	-	-	-	-	-	-	
Dyspepsia - - -	-	4	1	3	-	4	3	2	1	3	1	6	9	5
Erysipelas - - -	-	-	-	-	1	4	-	-	3	5	-	4	14	9
Epilepsy - - -	-	-	-	-	1	-	-	-	-	-	-	-	-	

* The classification is that of the Board of Health, and highly objectionable.

	1836.	1837.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.
	5	2	3	3	3	1	2	4	1	3	1	5	1
Exposure to cold - to heat, and drinking cold water -	1	-	28	-	-	-	2	-	1	5	9	-	1
Fever, bilious - catarrhal - congestive - gastric - inflammatory - intermittent - nervous - remittent - scarlet - typhus - ship -	83	32	37	46	49	38	68	38	43	53	70	44	52
	77	74	67	70	44	99	117	110	75	89	104	132	144
	3	2	6	4	7	10	7	11	4	4	7	1	-
	-	3	5	8	10	7	12	17	22	36	25	29	20
	-	-	-	-	-	-	-	1	-	-	-	-	-
	-	-	-	-	-	-	-	-	2	1	3	1	-
	-	-	-	-	-	-	-	-	1	2	2	-	4
	-	-	-	-	-	-	-	-	1	2	2	-	-
	-	-	-	-	-	-	-	-	1	3	1	1	-
Fracture -	-	-	1	-	-	-	-	-	-	-	-	-	-
Gout -	-	-	2	-	-	-	2	2	2	1	1	2	1
Gravel -	-	1	2	3	4	3	1	3	2	3	5	1	-
Hemorrhage -	-	9	4	10	5	13	11	4	14	6	8	10	8
Hernia -	-	-	-	-	-	-	-	-	-	-	-	1	3
Hip complaint -	-	-	1	1	-	1	2	-	-	1	-	-	1
Hives -	-	-	1	-	-	-	-	-	-	-	-	-	-
Hooping-cough -	-	43	69	18	75	9	35	63	20	59	62	26	104
Hydroarthrosis -	-	-	-	-	-	-	-	-	-	1	-	-	-
Hydrocephalus -	-	-	-	-	-	-	-	-	-	1	-	-	79
Hydrophobia -	-	1	2	-	-	-	-	-	-	1	-	-	2
Hysteritis -	-	-	-	2	-	-	-	-	-	-	-	-	-
Inflammation - of the bladder	-	3	1	2	-	1	1	1	-	-	-	-	3
bowels -	-	15	10	14	20	21	23	36	46	37	34	51	60
brain -	-	19	38	26	35	18	27	23	34	34	46	64	89
breast -	-	-	-	-	-	-	-	1	10	3	2	-	-
kidneys -	-	1	2	-	2	-	1	2	1	1	1	2	2
liver -	-	-	1	-	-	-	-	1	2	2	-	-	8
lungs -	-	8	8	9	10	9	7	10	14	21	11	8	20
stomach -	-	3	3	3	2	1	1	3	4	6	2	3	2
throat -	-	3	-	2	3	1	2	-	1	-	5	1	4
uterus -	-	-	-	-	-	-	-	-	-	1	-	-	-
Infanticide -	-	1	-	2	1	-	1	1	2	4	3	2	1
Influenza -	-	-	-	-	-	-	-	9	-	1	-	-	-
Intemperance -	-	50	35	47	30	35	29	18	15	10	20	16	16
Jaundice -	-	6	2	3	2	1	1	4	3	5	-	1	1
Liver complaint -	-	18	13	13	10	11	7	13	6	13	13	16	-
Lock-jaw -	-	4	3	2	3	1	1	5	4	3	1	3	1
Mania - à potu -	-	3	7	6	-	5	3	6	8	9	2	12	15
Marasmus -	-	27	32	30	18	3	5	5	2	-	1	-	-
Measles -	-	1	141	4	57	32	6	103	4	1	20	114	7
Mortification -	-	3	10	3	5	3	6	2	8	5	3	7	5
Mumps -	-	-	-	1	-	-	2	-	-	-	1	-	1
Murder -	-	-	-	1	-	-	-	-	-	1	1	-	-
Neuralgia -	-	-	-	-	-	-	-	1	-	-	-	3	1
Old age -	-	137	93	94	118	96	94	98	120	93	97	129	144
Ophthalmia -	-	-	-	-	1	-	-	-	-	-	-	-	-
Organic disease of the heart -	-	6	7	4	5	20	17	27	19	30	39	47	30
Palsey -	-	13	12	18	12	24	13	1	21	21	17	10	35
Paralysis -	-	-	-	-	-	-	-	-	-	11	6	-	-
Piles -	-	-	1	-	-	-	-	-	-	-	-	-	-
Phthisic -	-	-	-	-	-	-	-	-	-	2	-	-	-
Pleurisy - bilious -	-	74	66	50	55	47	38	66	86	54	26	18	32
Poison -	-	2	1	-	1	2	-	2	4	-	3	4	2
Pneumonia -	-	-	-	-	-	-	-	-	1	-	2	1	39
Quinsy -	-	1	7	5	1	1	1	1	2	1	2	-	-
Rheumatism - inflammatory -	-	-	5	2	4	7	6	9	3	5	-	5	4
	2	-	3	2	2	-	1	4	1	6	4	2	1

	1836.	1837.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	1848.
Rupture -	-	2	-	-	2	1	2	1	-	-	-	-	-
Scald -	-	3	4	-	1	2	1	-	1	1	-	-	-
Scirrhous of the stomach -	-	1	-	-	-	-	-	-	-	-	-	-	-
Scrofula -	-	2	12	11	3	8	5	4	3	2	5	3	3
Small-pox -	-	1	52	71	2	9	1	1	-	-	110	115	1
Spasms -	-	6	5	-	3	-	-	1	1	-	-	-	-
Spleen -	-	-	-	-	-	2	-	-	1	-	-	-	-
Stillborn -	-	181	196	215	171	191	201	178	187	214	211	257	381
Sting of a wasp -	-	-	-	-	1	-	-	-	-	-	-	-	-
Stone -	-	-	-	-	-	1	-	-	-	-	-	-	-
Strangulation -	-	-	-	-	-	-	-	-	2	1	-	-	1
St. Vitus' dance -	-	-	1	-	1	-	-	1	-	-	-	-	-
Sudden -	-	32	22	21	26	27	25	14	19	13	1	6	17
Suicide -	-	10	5	6	3	7	3	5	1	5	6	4	3
Syphilis -	-	1	-	-	1	-	-	-	-	-	-	-	1
Teething -	-	16	28	21	15	21	28	29	29	16	19	42	69
Thrush -	-	3	6	6	5	3	6	4	6	2	-	5	7
Tic douloureux -	-	-	-	-	-	-	-	-	-	1	-	-	-
Tumour -	-	2	-	4	1	5	1	2	3	8	3	9	1
fungous -	-	-	1	-	-	-	-	-	-	-	-	-	4
Ulcer -	-	1	-	-	2	-	1	-	-	1	-	-	-
Ulcerated sore throat -	1	1	5	3	7	1	1	2	1	1	4	2	1
Ulceration of the bowels -	-	-	-	-	-	-	-	-	-	1	1	-	-
Unknown, adult, -	16	13	30	20	46	29	25	47	82	85	87	96	178
infantile -	478	516	535	515	468	487	490	446	466	575	533	587	489
Varioloid -	-	-	1	1	-	2	-	-	-	-	-	1	1
White swelling -	-	-	-	-	-	-	-	-	-	-	-	-	-
Worms -	-	13	18	20	15	4	8	3	5	7	7	12	6

TABLE E.

BALTIMORE.—*The Ages at which Death has taken place for thirteen years, 1836—1848, inclusive (Stillborn not enumerated).*

Year.	Under 1 year.	1 to 2.	2 to 5.	5 to 10.	10 to 21.	21 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Total.
1836	584	180	208	78	109	203	227	191	147	124	81	41	11	8	2192
1837	630	275	324	148	172	217	250	162	103	115	80	35	6	1	2518
1838	655	256	246	125	154	238	276	188	124	98	61	44	8	3	2376
1839	612	257	266	99	112	189	220	148	116	97	88	45	9	2	2260
1840	532	182	183	93	123	205	226	166	126	82	76	44	5	2	2045
1841	651	217	208	82	123	214	231	165	120	107	73	45	8	3	2448
1842	666	315	263	106	157	225	121	191	109	93	46	49	10	6	2454
1843	682	229	153	91	138	251	234	166	112	132	94	42	9	2	2333
1844	630	285	363	158	161	212	262	222	126	110	72	42	13	9	2665
1845	830	208	351	149	155	282	305	228	144	115	71	37	14	6	2896
1846	786	287	320	167	200	263	305	232	135	129	94	59	15	3	2994
1847	866	420	376	173	151	320	343	259	176	124	133	57	12	4	3414
1848	959	471	508	220	207	352	349	261	174	152	128	57	17	6	3861

H.—8.

Report on the Sanitary Condition of Charleston, South Carolina.
By P. C. GAILLARD, M. D.

DR. JAMES WYNNE,

Chairman of Hygiene Committee of American Medical Association,

SIR: As a member of the Committee on Hygiene, it is my duty to furnish such information as I have been able to collect, relative to the city of Charleston. The materials for a report on the hygiene of this city are, however, by no means abundant; and much of the information, with which I have been furnished, is deficient in detail, and lacks precision. Under the direction of our city council, measures are now in progress for gathering up all the important statistics relating to the population, health, mortality, trade, &c., of the city; and should the results be made known sufficiently early to be of service to you in preparing your general report, they shall be forwarded to you. I will now proceed to reply to the interrogatories contained in your circular of May 1848, in the order in which they there occur.

“1. What is the population of the town, and its position in relation to the surrounding country, the nature of its surface and subsoil, the means of, or impediments to drainage, more especially within the town limits?”

In 1840, by the census of the United States, Charleston contained a population of 29,261, of which 14,788 were white, 14,473 black and coloured. The suburbs contained at the same time a population of 11,876; but as these are not within the corporate limits, are not governed by the city laws, keep no bills of mortality, and have little or no medical police, they will not be included in this report.

The city is situated on a narrow neck or tongue of land, between Cooper River on the east, and Ashley River on the west, in lat. $32^{\circ} 46'$, long. $79^{\circ} 57'$. Cooper River is rather more than a mile wide, and beyond it are extensive salt marshes, over which every tide flows, and which are covered with a luxuriant growth of salt-marsh grass—the *spartina glabra*. Ashley River, on the west, is not so

wide, and the marshes, on its further shore, are less deep. Along its margins, on the city side, considerable salt marshes still exist—there are none such along the margins of Cooper River within the city limits. The two rivers unite at the point of the peninsula on which the city is situated, and below, widen out to form the bay. They discharge their waters into the ocean, seven miles below their point of confluence. Towards the north, the city is directly contiguous to the suburbs; and beyond the latter, the country is flat and sandy.

A great part of the city has been built upon reclaimed marshes, and the beds of creeks and ponds, which have been filled up.

The geological structure of the soil is alluvial. The surface consists of yellow or gray sand, resting on a stratum of red, ochrous clay, under which white or gray sands again occur. The depth of this alluvium is about twenty feet, and the water of our wells is derived from it. Under the alluvium, blue mud and sand are found, containing the characteristic shells of the post pliocene formation, the newest of the tertiary; and below the post pliocene, the eocene or lower tertiary beds are met with of great thickness, and composed principally of marl. The influence of this arrangement on the drainage of the city, is explained in the following extract from a very interesting monograph, on the Geology of Charleston, by Mr. F. S. Holmes, to which I am indebted also for the information given above.

“The natural drainage of the city, as affected by its geological structure, is next worthy of our notice. The waters percolating from the surface, I have already said, are obstructed in their downward course by the blue mud of the post pliocene bed; while their escape, in a lateral direction, is prevented by the clay deposited along the sides of the above-described creeks. In rainy seasons, all the water that is not carried off by the surface drains, is retained to the depth of about eighteen feet, and the earth becomes completely saturated by it; the present sewers admitting little or no water, except through the gratings from the streets. Hence, it appears that the wells of the city are its principal vents or drains, and that the quantity of water consumed daily by the citizens from these wells, will be the measure of the drainage.”

“2. What is the character of the town in reference to health? What is the condition of its most unhealthy and crowded parts where disease is supposed to be most prevalent, and to what causes are such diseases mainly attributable?”

The character of Charleston in reference to health is very fair. From a report, by the City Register, of the interments for the eighteen years from 1828 to 1846, it appears that the annual proportionate mortality averaged 1 in 44.11; whereas, for the last eight years, the average has been but 1 in 52. The causes of this difference are obvious. In 1836, epidemic cholera prevailed here, and carried off 392 persons, increasing the mortality that year to 1 in 25.84. In 1838, in the month of May, a dreadful conflagration laid one-third of the city in ashes. By this, vaults and cellars containing offensive and decomposing matters, were exposed to the rays of the summer sun; and yellow fever, the most severe which we have had during the present century, made its appearance, victims being abundantly furnished for its ravages in the numerous Irish and other labourers who flocked here to aid in rebuilding the burnt district. The disease also prevailed to a less extent in 1839. The mortality for 1838 was 1 in 25.05; and in 1839, 1 in 35.38. These disastrous years of course increased the ratio of deaths for the series of years to which we are at present alluding. "But since the rebuilding of the city," says the City Register, in a letter to me, "we have had no epidemic of yellow fever (a period of eight years), and the average mortality has been 1 in 52. By the efficient system of drainage now existing, and the activity of the Board of Health in reporting all nuisances likely to injure the public health, I am satisfied that our city does, and will continue to enjoy as great a share of health as any other maritime city in our widely extended Union."

The most beneficial effects appear, indeed, to have resulted from the system of grading and draining the streets which has been adopted. Many of the practitioners of our city are also impressed with the belief that the shells with which many of our streets have been covered, have contributed something to the improvement of the health of those quarters; and, when we reflect on the influence which lime is said to possess as a disinfectant; when we remember that a considerable portion of country about Leith is said to have been rendered salubrious, and fevers of a malarious nature to have been extirpated by the use of lime, we can readily allow some influence to this cause. Our exemption from yellow fever of late years is not, however, to be taken as a positive proof of this. In the history of this disease in our city, the following curious facts have been observed, and are recorded in the books of the Medical Society of S. C. In the year 1791, yellow fever reappeared in the city, after an absence of thirty-seven years, or from 1755, and prevailed more

or less violently almost every year after until 1807. From 1807 to 1817 there was no epidemic yellow fever in Charleston. But in 1817 it again appeared, and was very severe, and again it prevailed in 1819, '24, '27, '28, '34, '35, '38, and '39, since which, as already stated, with the exception of a few cases in 1840, and one or two in 1843, our city has been entirely exempt from the disease. That the health of the city has been improved by the system of drainage, &c., adopted, and by the general vigilance of the proper authorities, I entertain no doubt, but sufficient time has not yet elapsed to enable me to state it as a proved fact.

The most crowded parts of the city are Market street and neighbourhood, State street, Elliott street, and the eastern end of Tradd street, all the streets enumerated being on the eastern, or commercial side of the city. In these situations, the houses are generally built in blocks, and have very small yards, which are the most filthy of the city. These are the localities of sailors' boarding-houses, and their concomitant houses of prostitution, and of the lodging-houses for the poorer classes generally. It is here, therefore, that we should expect to find all the elements of disease, and accordingly it is here that yellow fever first appears, and rages most violently.

It may be asserted that with us yellow fever has constituted the test of the healthiness of the different quarters of the city proper, as typhus does of more northern sites. As just remarked, yellow fever invariably appears in the city first, in or near one of the localities mentioned, and to whatever cause the origin of the disease may be attributed, it there continues to rage with most violence. "During all epidemics of yellow fever," says the City Register, in the letter already quoted, "the large majority of patients were from Elliott, Tradd, Market, and State streets, which streets are the most closely built up, and worst ventilated of any in the city. But at the same time, these streets are occupied almost exclusively by that class of people most liable to the disease, viz., sailors, and strangers of the lower orders, given to drunkenness, &c. In ordinary years, these streets are as free from disease as any others in the city. Upon the whole, I would say that there is no one locality of the city more liable to disease than another, except the above-mentioned streets, and they only when yellow fever prevails as an epidemic."

You will have remarked that the localities just spoken of are not only the most crowded, most badly ventilated and filthy, but are also the chief, almost the only resort of sailors. This leads me here, to consider your suggestion regarding quarantine laws, in relation to

diseases peculiar to our geographical position. The only disease which can come up in this connection, is that of which I have already spoken—yellow fever. The question has often been agitated here, as to whether the disease may not sometimes be imported, and afterwards spread among the unacclimated inhabitants. With us, as elsewhere, this has been the subject of much controversy; the opinion of the profession generally, however, is very decided against the idea of importation, which would involve in some measure the idea of contagion. Others, although few in number, have not been wanting, who have maintained the opposite ground. Among these I may mention, Prof. Dickson, late of the Medical College of South Carolina, now of the University of New York, and Dr. B. B. Strobel. The latter has published a volume to prove the transmissibility of yellow fever, in which he contends that, when the atmosphere of a place is in a state to produce some form of febrile disease, the arrival of a vessel from a port where yellow fever is prevailing, may so infect the atmosphere, as to generate that peculiar form of fever; this peculiar state of the atmosphere being wanting, the poison will be harmless. To sustain this point, many facts in the history of yellow fever, familiar to the profession, are adduced; and Dr. S. endeavours further to prove that the fever which prevailed in this city in 1839, was imported by vessels from the West Indies. This he does by showing that the first cases occurred in the immediate neighbourhood of such vessels, that the disease was carried into lodging-houses in Market street, and subsequently extended among persons in that neighbourhood.

The recent case of the Eclair steamer, and the appearance of yellow fever at Boâ-Vista, is so strong and positive, that, when added to that of the ship Baum, and the importation into, and spread of the disease, in the island of Ascension; the communication of the disease by the French ship Palinure to her English prize, the Carnation; and from their French prizes to the British ships Thetis and Hussar, there is little doubt that infected vessels may transmit the disease to other persons and localities, under peculiar circumstances. What these circumstances are precisely, it is impossible to say; but the previous existence of a high range of the thermometer, combined with unfavourable hygienic conditions, such as those stated to exist in the part of our city where the disease first appears, and rages most violently, are probably the most important. The inference I would deduce from these remarks, in relation to quarantine, is clear, viz., that, during the great heats of summer, vessels from ports where

yellow fever is prevailing, especially if they have, or have had cases of the disease on board, should be subjected to quarantine, be thoroughly cleansed, ventilated, and whitewashed; that the cargo and effects of passengers and crew be opened, aired, &c., and that no case of the disease be introduced into the city. By proper hygienic precautions, however, within the city, by removing the states which favour the spread of the disease, and which are antecedents necessary to its extension, its importation may be prevented and its course arrested.

The malarial fevers (intermittent and remittent) are by no means as common in Charleston as they formerly were. I here speak in reference to the city proper—they still prevail in the suburbs. Remittent fever, generally of a mild form, is sometimes observed to originate in the city; intermittents are more rare. The cases of death recorded in our bills of mortality from these fevers are, almost without exception, of persons who contracted them in the neighbouring country; and hence, they are often reported as *country* fever, from the place where they were contracted. The salt marshes along the western border of the city, do not seem to have any deleterious agency in giving rise to these forms of disease. It is worthy of remark, that in the years when yellow fever prevailed, there was no uniform increase in the deaths by the malarious fevers. But the reports of the City Register show that there *was* a remarkable increase in the number of deaths by typhus in the years 1838, '39, and '40; years in which yellow fever prevailed, in the two former extensively. The mortality from this cause, for the two years immediately preceding 1838, was eight for each year; whereas, in '38, it was twenty-four; in '39, twenty-five; and in '40, twenty-one; and since the last date, there has been a gradual diminution in the number of deaths by typhus; so that in '46 there were but ten, and in '47, but seven deaths from this cause. It was, for some time, thought that typhus and typhoid fevers were taking the place of the malarious fevers among us. If, however, such a tendency did for a time exist, it has passed away; and, although there has of late been no remarkable increase in the number of cases of remittent and intermittent fevers, their antagonistic diseases have certainly not shown any tendency to increase.

The bills of mortality are made up principally from the returns of the sextons of the different burial-grounds; who are required, before interring a body, to have the certificate of the physician who attended, stating the name, age, and disease of the deceased. The

accuracy of the bills is not altogether to be relied on. In looking over them, one cannot avoid being struck with the great faultiness of the nomenclature which they exhibit. It is to be hoped that the nomenclature of diseases, recommended by the Association, will hereafter be adopted not only here but throughout the United States. A few examples will suffice to show the defect alluded to. Under the head of fever, we find, among others, the following: bilious, country, strangers', remittent, intermittent, and congestive. I do not doubt, that persons at a distance are sorely perplexed with some of these names. Now, one name, remittent, would have sufficed for bilious, remittent, and country, for they are the same; the last being so called because contracted in the country. Again, strangers' fever means yellow fever, and this name is given because strangers are the subjects it attacks. Many other defects might be noticed, but most of them have already been pointed out in the Report of the Committee on a Nomenclature of Diseases, &c., presented to the Convention in 1847.

"3. What are the arrangements for drainage? Is there a public survey of levels? Are the streets and alleys laid out with a proper inclination for surface drainage, or are they defective in these particulars? Is the drainage effected by sewers or surface drainage? And is the mode adopted effective?"

Most of these points will be answered by the following extract, from a letter addressed to me by his Honour the Mayor of the city: "The city is drained by means of subsoil brick drains, running through the centre of the streets from river to river. In those streets that are graded (convex in the middle, and either macadamized, paved with round stones, or unpaved), there are surface drains running parallel with the side walks, with grate openings, which communicate with small brick diagonal drains running to the main central drain. From the lots on either side of the streets, small subterranean drains likewise connect with the central drains, thus draining both streets and yards. This system of drainage has been adopted within the last twelve years, with marked improvement to the health of the city. The mode is effective. Many parts of the city are still imperfectly drained."

The mode of drainage, described in the above extract, is doubtless efficient, so far as it has been carried out; but, unfortunately, one-half of the streets are still in a bad state as regards drainage. These have also central drains, but the streets are concave, have no surface drains at the sides; and the water which falls, in part finds

its way into the drains through grates at long intervals in the centre of the streets, and in part, owing to the inequalities of the surface, lies for days on the surface until it is evaporated, or is absorbed by the soil. This state of things is, however, gradually being corrected; and, within the last few years, attention having been more especially directed to the subject of hygiene, more progress has been made than for a much longer term of years previously.

“4. What is the mode and expense of cleansing the streets? Are the courts and alleys occupied by the poor cleaned, and how often? Where is the refuse from the houses deposited, and where is the street manure kept, and how disposed of?”

This will also be sufficiently answered by the following extract from the letter just quoted: “Residents are required by law to sweep their yards and in front of their houses daily (Sundays excepted), and to deposit the sweepings and offal near the curb-stone, in front of their dwellings, before 9 o'clock A. M., from whence they are removed by carts employed by the Superintendent of Streets daily, the work to be done throughout the city at or before 1 o'clock P. M. The offal is deposited, during the summer months, at some point remote from habitation; and in winter, it is used for filling up low streets and marsh lands owned by the city, to be afterwards covered with earth.

“The city is divided into two *divisions*, the upper and lower; for each of which there is a superintendent, who is bound to provide six carts, horses, and labourers, and who is responsible for keeping clean the streets, under the direction of the mayor. Each superintendent is elected by the City Council, and each receives a salary of \$2800 per annum.”

It may be stated further, that, in order to insure the removal of offal, and to keep yards, &c., in a proper state, the Board of Health have the power to make domiciliary visits, and to order any offensive matters removed. They may, also, when necessary for insuring the proper drainage of lots, direct those which are so low as to hold water to be filled up, and proper drains constructed for carrying off the water. Should the owners of such lots fail to comply with these directions within a specified time, the work is done by the city, and the cost charged to them (the owners of lots). In this manner, when the Board is active, as they always are on the approach of summer, or when the visitation of such an affection as cholera is apprehended, a thorough cleansing of all the lots of the city is insured.

5. The condition of the more densely populated parts of the city

has already been mentioned. The streets are generally of sufficient width, and there are few alleys, and still fewer courts built up and closed at the end. The houses of the poor are either small wooden buildings, occupied by but one family, or they inhabit larger houses in the vicinity of East Bay, in which case many families reside in one house. Recently, ranges of comfortable two story tenements have been constructed of brick in different parts of the city, and many families of the poor reside in such; each family occupying a tenement consisting of a room below and one above stairs. These are the best residences for the poorest classes which we have. The houses are ventilated by means of windows, and generally there is no deficiency in this respect, except in the cases alluded to in the earlier part of this Report. The houses are warmed by wood or coal fires, generally in open fireplaces. Stoves are comparatively rare.

6. In relation to public schools, the chairman of the commissioners, the Rev. C. Hanckel, has kindly furnished the following information: "The system of our free schools in the city is like that of our private schools, with the exception that the instruction of the pupils is confined to a simple elementary English education, embracing spelling, reading, writing, arithmetic, history, geography, grammar, and natural history; and that our schools are held morning and evening (afternoon), with the usual interval of recreation from 12 to 3 o'clock.

" Its influence on the health of the children is, doubtless, beneficial; the confinement being too short to fatigue, and sufficiently long to restrain them from exposure by strolling through the streets, or loitering about places dangerous to health or morals.

" Children are admitted at all ages; but principally between six and nine years, and remain in the schools from one to fourteen years—upon an average, about five years.

" The school-rooms are of a moderate size (being hired by the teachers at their own expense), barely sufficient to accommodate the pupils, the number of whom in each school is about one hundred. The legislature has, at its last session, authorized the commissioners to raise a fund out of the general taxes for the purpose of erecting suitable school-rooms.

" Time allotted to instruction six hours (from 8 to 12 M., and from 3 to 5 P. M.) a day—Saturdays and Sundays excepted. For exercise in the open air—the intervals between school hours.

" Vacations—two weeks in April and December. Holidays—Fourth of July and Thanksgiving days."

7. There are two hospitals—the Marine and the Almshouse Hospitals—the former, confined to sailors; the latter, open to all indigent sick white persons. The latter is defective in many respects, and a good general hospital is much needed here. There is, also, a dispensary, with two physicians, who visit such of the poor at their domicils as require medical aid.

8. *Water.*—The supply of water for drinking is from cisterns, of which there are a few large public ones; but private residences are often provided with them. In some localities, the well or pump water is potable; but it is generally used only for cooking, washing, &c.

From the geological structure of the country, it is thought that pure water may be obtained from the stratum of sand, underlying the tertiary strata, by means of Artesian wells. The corporation have, in consequence, employed a competent person for the purpose of boring an Artesian well, and the work is now in progress with every prospect of success. A depth of 431 feet has been reached, and the water already rises to within one foot of the surface. The water-bearing stratum is supposed by Mr. Tuomey, late State Geologist, to lie under the burr-stone formation of the tertiary, at a depth of about 650 feet.

I have thus, to the best of my power and knowledge, given the information required by the committee, and only regret that it is not more satisfactory. I would conclude with the following brief summary:—

1. From its almost insulated position, Charleston is little liable to the malarious diseases which prevail in the neighbourhood, and in all the lower part of South Carolina—the pine ridges excepted.

2. That the character of the city for health is very fair, and has improved much of late years. That this improvement is to be attributed mainly to the improved condition of the streets, to their being paved (and possibly to the lime of the shells with which some of them are covered) and well drained, and to the greater attention to the cleanliness of lots, yards, &c. That the most filthy and crowded parts are the most unhealthy, and that it is there that yellow fever first occurs, when it occurs at all, and prevails most severely. That there has been no epidemic of this disease for eight years; that its cause is somewhat uncertain—it being by some regarded as always of endemic origin, and by others, as sometimes introduced from abroad.

3. That the drainage of the city is as yet very imperfect—many parts being in this respect in a bad state. So far as the system now pursued has been carried, it has proved very effective, and it is being every day extended. This system consists of subterranean drains in the centre, and surface drains at the sides of the streets, the latter communicating with the former by small subterranean drains, the streets being convex.

4. The streets are cleaned daily, and the offal from the houses is removed every day.

The other points are answered so briefly, that it is needless to give a summary of them; and I will now submit this very imperfect report to your kind indulgence and consideration.

I remain, very respectfully,

P. C. GAILLARD, M.D.

CHARLESTON, S. C., *January 1849.*

I herewith send a letter from the chairman of the Board of Health relative to the medical police of the city, which has just been received—too late to be introduced into the body of the report.

P. C. G.

January 27th.

CHARLESTON, *January 25th, 1849.*

To DR. P. C. GAILLARD.

MY DEAR DOCTOR: You addressed to me certain inquiries of the Committee on Hygiene (of the United States Medical Association), of which you are a member, especially as regards the system of medical police. Our system, as of all other well-regulated cities, is twofold: one, external; the other, internal.

1. Of the *external*. It is required of the pilots at all seasons of the year, if sickness is on board (and they are under heavy penalty for neglect), to bring the vessel to quarantine ground to be examined by the port physician. The object of this is to prevent the introduction of small-pox. In some instances, cases have occurred which were well on arrival, but broke out afterwards in the city. Of this, the port physician has been informed by the physician attending on the person where the patient resides. The patient is, if practicable, removed to the Lazaretto, or all available means used to isolate him, and prevent the extension of the disease. An inspection of our bills of mortality, and general diseases, as reported by the City Register, will show how long we have been exempt from small-pox

from this system, for it must be understood that every winter there are cases of small-pox at the Lazaretto. In summer, all vessels coming from more southern latitudes and the West India Islands, are brought to quarantine and inspected. At any season of the year, when an epidemic of a supposed contagious disease occurs, all vessels from the port where the epidemic prevails are subjected to quarantine. Thus far, then, for external medical police. I do not enter into the long agitated disputations concerning the contagious or non-contagious character of certain diseases. We act in all these cases where there is a doubt, exactly as if they were contagious.

2. I will now proceed to the *internal* medical police. The Board of Health consists of eighteen members elected by the City Council, and a medical committee composed of medical officers of the city institutions and port physician, a State officer, of which the City Register is *ex officio* chairman, and the two elect a chairman of the whole Board. The duties of the members elect of the Board are, to inspect the various lots, and direct that all nuisances be removed therefrom. But in cases where cellars or lots which contain water require to be made water-tight or drained, then a Board of Inspection is convened, which consists of the mayor of the city and four members of the Board of Health, whose decision is confirmed always by council, and promptly put into execution. It is the duty of the Medical Committee to be the medical advisers of the Board; and of the City Register, who is chairman *ex officio* and clerk of the General Board, to keep the meteorological observations, the bills of mortality, births, and marriages, as far as practicable, and see that nuisances are removed from premises. The system of our Board of Health, which has been thoroughly organized since 1840, has worked so well as to have enabled that body to act with energy and efficiency in removing everything deemed likely to produce or aggravate epidemic disease; and our annual bills of mortality will show the diminution of mortality, and likewise, that we have not had yellow fever prevailing among us since 1839. In 1838 and '39, there were abundant causes for the existence and prevalence of yellow fever. One-third of the city was burnt in the spring of 1838, causing the exposure of an immense surface, leaving cellars and vast masses of burnt up materials exposed to the rain and sun, and which could not easily be removed; add to this, a great number of artisans, from the North and elsewhere, came to Charleston (as labourers of that kind were in demand) to rebuild the city; and these, from want of houses, crowded together, and badly accommodated. From

the statement, it will be perceived that it would have been wonderful, with these predisposing and exciting causes, should yellow fever not have occurred in these years. A circumstance worthy of consideration is that, in 1838, of 354 cases of yellow fever, 340 were strangers, and only 14 natives, under 14 years of age. In 1839, of 134 cases, 124 were strangers and only 8 children under 14—strongly evincing how the acclimated are protected, and the real causes of the disease in 1838 and '39.

I will now give you a statement of the plan of internal medical police. 1st. Cellars are required to be filled up or kept perfectly dry. This we regard as of great importance in our damp and low locality; and no cellars are allowed in houses to be built. 2d. All lots, except tide-lots, where the salt water ebbs and flows, are required to be thoroughly drained, or, if too low to be drained, then to be filled up. 3d. Our streets generally have subterraneous drains, into which the smaller drains from the various lots open; and in the main-drain, grates in the centre of the streets were placed. Much evil was occasioned by this arrangement, for much of the earth of the streets was thus thrown into the drains, choking them up and causing the water after heavy rains to remain in the street, and likewise regurgitating upon the lots, they not having free vent, and, above all, an accumulation of filth in the drains which caused much expense to cleanse, and exposed an immense mass of foul material, stagnant in the drains, to the external surface. A new system since 1840, from whence we date the improvement of Charleston, has taken place, viz., to convex the streets either with stone or some other hard materials, and to construct drains at either side of the streets, by which a rush of water passes into the main drains without solid refuse, cleansing and purifying them; this system is progressively advancing. 4th. All offals are daily removed, by the superintendent of streets, from the respective residences. Efforts have been made to induce the citizens to have their cemeteries beyond the city; but the strong associations connected with the family burial-grounds in the churches rendered it impracticable to use any than commendatory measures, which have proved unavailing. But an ordinance was passed by council in 1836, forbidding burial-grounds hereafter to be established in our city. The Second Baptist Church, in contravention of this law, buried some dead in the yard connected with their church; it became a matter of litigation, the discussion of which is still pending.

We have regarded these measures as highly important in medical

police, and the plan will, doubtless, be progressively prosecuted, and I really think it has much to do with the continuance for years of health in our city. The authorities are attending, as you know, to another point—a plentiful supply of pure water, so important to the health of the city. I have thus, my dear doctor, given you a succinct view of our medical police; you being in possession of our official documents.

I am, with much esteem,

THOMAS Y. SIMONS, M.D.,

Chairman of Board of Health and Port Physician.

H.—9.

Sanitary Report of New Orleans, La. By EDWARD H. BARTON, M. D.

NEW ORLEANS is situated in latitude $29^{\circ} 57' 30''$ N., and longitude $13^{\circ} 9'$ W. from Washington, on the alluvion banks of the Mississippi (the longest and swiftest river, susceptible of more extensive navigation, and draining a larger surface of country, than any on earth), and about one hundred and ten miles from its mouth, by the meandering course of the stream, and about ninety in a geographical line. It is protected from inundation by the great stream that glides by its front, at the rate of four and a half miles per hour in the thread of the current, during high water, and four and a quarter miles at low water, by a levee or embankment, about nine feet higher than it is a few squares back; and the city descends by a gentle slope to the swamps and draining canals in the rear, commencing about —— distant from the levee, where the surface of the swamp is —— feet below high water mark; but which is now kept several feet (four to five) above water mark, by the Draining Company; all of which will clearly appear by reference to the line of levels annexed (*vide* Appendix A), from the river through the centre of the city to the Bayou St. John.

The geological formation of the soil on which the city is built, is alluvial; the surface and subsoil, to a great extent, being composed of the deposits of the river. In some places, beds of pure white sand occur, at a depth of six to ten feet, showing the former positions occupied by the waters of the gulf. The height of the ground on the river bank is about fourteen feet above the level of ordinary water in the gulf. The river usually commences its rise about the last of November, attains its maximum elevation in March, remaining thus until the latter part of May, then falls more rapidly than it arose, till about the latter part of September, and remains stationary until the autumnal rise.

The city occupies a front on the river of about five miles, by an average breadth of about three-quarters of a mile. It is bounded

on the north by a cypress swamp, of about five miles in breadth, where it reaches Lake Pontchartrain, a large body of water extending due north about twenty-five miles, and east and west from its centre about twenty miles. The Mississippi River runs south of east from New Orleans about twelve miles, and the balance of its course south-east to the Belize. It is bounded to the east by plantations and swamps covered with forest, to Lake Borgne, an arm of the sea fifteen miles distant, of about fifteen miles of irregular diameter. On the south, it is bounded by the Mississippi River, across which are cleared land, and swamps covered with forest growth, to Lake Ouacha (a body of water, about five miles wide, and eighteen long, extending to the south-west, and thence to the sea, it is forty to fifty miles); and it is bounded due west by the meanderings of the river, fine cultivated estates, and forest growth for about eighty miles.

The prevailing WINDS, during *winter*, are, according to respective prevalence, from E., N., and N.W.; during *spring*, from E., S., S.E.; during *summer*, from S.E., E., and S.; and during *autumn*, N., E., and N.E. A perfectly calm atmosphere is very rarely noted; resulting, no doubt, from our alternations of land and water, and the rapid current of the Mississippi before so large a surface of the city. It has been remarked as a fact, pregnant with great consequence to us, that, as the forest is cleared back towards, and covering the swamps, and to the lake, there is more air stirring, and less disposition to stagnation; and with the drainage there is less moisture, and the land rises. The ventilation of the city is not at all defective; the streets are nearly all at right angles (there are few or no blind alleys), of the average width of between thirty to forty feet; four or five of them being upwards of one hundred feet, and most of these planted with trees. There are six public squares, most appropriately termed the "lungs of large cities," and all the streets would be in some measure entitled to the same beneficent appellation, were they planted with forest growth. Owing to the warmth of the climate, the houses are extremely well ventilated, even those of the poor, with but few exceptions in and about the centre, and near the markets, occupied by small traders and emigrants, mostly foreigners; but in general, the labouring population is comfortably provided for, if at all provident; for, such is the facility of acquiring here the necessities, and even comforts, nay, luxuries of life, and in a few years, a competency, that nearly all provident, temperate people find little difficulty in doing so; the wages of labour, and particu-

larly mechanical labour, are in great demand, very high, and support not costly.

The average annual quantity of RAIN, falling in this city, is about fifty-two inches ; and although there is no proper *rainy season*—for, some years, there is just as much falling during one-half of the year as the other—yet in a long series of years (say ten, that I have overlooked my meteorological register for), there was a larger quantity falling in the winter, the next was in the summer, the next was during the spring, and the driest season was clearly and palpably the autumn. But, as the hygrometric condition of the atmosphere is but poorly estimated by the quantity of rain that falls from it, for sometimes it is directly the reverse, I have constructed a chart, exhibiting these *often opposite conditions* (*vide Appendix C*), where this is seen at a glance, and also the thermometric and barometric variations, with their respective relations to each other.

The average temperature of our WINTER months is 53.77 ; of the *spring*, 67.76 ; of the *summer*, 79.27 ; and of the *autumn*, 67.51 ; making an *annual average* of 67.07, almost that perfect temperature thought to be most agreeable and salubrious to man. The thermometer rarely reaches 90° in a fair exposure, during the summer, and during the winter seldom descends below 30°. The average *daily* range, throughout the year, is near 10°. In more southern tropical regions, where these variations of temperature are unknown, the constitutions of the natives are rendered delicate and most sensitive, by a uniform continuance of a high atmospheric temperature, and if a fall of the thermometer of from 2° to 5° is experienced, serious consequences to comfort, and even health, are experienced. These changes are essential to vigour of constitution, and it would be a great blessing were they much greater. The nights are cool and pleasant ; and with more attention to the construction of our houses, to adapt them to our climate, the sleeping rooms in summer facing the southern quarters, whence there is almost every night a body of air stirring ; and planting trees in the principal streets, the heat would be much less, radiation from the brick buildings would be arrested, the air purified, and the great extreme at midday and towards night, almost thoroughly controlled.

The effects of planting trees in the streets, and of the multiplication of public squares, are well-established facts, of which there is now no dispute ; experience here is too strong even for theory. A statement was published here some years ago, by one of our most respectable journals (*The New Orleans Delta*), and said “to be derived

from one of the old respectable inhabitants, and one of the chief magistrates of the city," that there had rarely "occurred a death on the Place d'Armes, in twenty-five years." This is the most beautiful public square in the city, and on two of its sides has a dense population. The influence of luxuriant foliage and abundant shade in the public squares and streets of large cities, and particularly southern ones, is susceptible of very easy explanation; they absorb deleterious gases, and receive or prevent that reflected heat from brick houses, which is so oppressive to those who cannot otherwise escape their influence; and they hence assist in likening a city to the country, between which there is so great a discrepancy in mortality, and the difference is mainly in ventilation, shade, and foliage.

Truly, this may be considered a "SUNNY CLIMATE," for of a series of observations, extending into many years, in reference to "clear," "cloudy," and "rainy," from my meteorological journal, more than two hundred and forty days were registered "clear," seventy odd "cloudy," and about thirty "rainy" (of the three hundred and fifty noted). And from consulting a register kept here more than forty years ago, the "clear" days have greatly increased since that period; there is much less moisture in the atmosphere, less rain falling, and fewer storms; the winds diminished in strength, and more regular, the heat sensibly less, and the climate, in many respects, greatly ameliorated. All this has resulted, doubtless, from cutting down the forest growth of the neighbourhood, clearing, cultivating, and "subduing" the land to the purposes of man, and instituting that system of drainage that is destined to give this country all the advantages of an elevated champaign country, together with its own, of incomparable fertility, as much moisture as is needed for the purposes of agriculture and health, with the assurance of ample ventilation. For more particular reference to the meteorology of New Orleans, I refer to Appendix B and C, embracing an average of three years (anterior to 1843), containing a pretty fair estimate of the climate.

From all the exhibits, then, in relation to ventilation, it is apparent that the mortality of the climate arises from no noxious principle derived from stagnation of air, and that we are located in that happy medium, removed from the violence of the winds of the tropics, where the natives seem to dread it more than almost anything else, from their greatly enhanced susceptibility of nervous system, and the frequent stagnation of temperate regions. Here,.

then, there is *nothing* stagnant, neither the elements nor man; though the latter is too "go-ahead" for his interests or his health.

The city is now drained from its surface, which is extremely imperfect, and in this climate highly objectionable. The gutters are cleared by rains; by letting in water from the river at particular points at certain stages of elevation; by a steam engine in the First Municipality, for the streets appertaining to it and running perpendicular to the river; and very partially by the Water Works Co., and all most imperfectly done. The mode of removing ordinary street accumulations, from constant filling up of the gutters, and the mud pressed up from a most imperfect system of paving, with large irregular pebbles, on a moist mud substratum, is, to throw or scrape it up from the gutters, and about the surface into the streets, in heaps, for its more fluid parts to drain off, and then, after abundant exposure to the sun, it is carried off in uncovered carts, from time to time to the rear, to fill it up, at great expense to the city, and at some offence to our olfactories. The law now requires all offal from the houses to be thrown into the river, instead of the back lots, which it aided in filling up, at no expense of health to the vicinage, but sometimes offensive to smell. It is all most imperfectly carried out.

Time does not permit me to go into a system of drainage and sewerage, that is demonstrable, from effects already produced on the swamps in the neighbourhood, can make this city as dry, and, with the water power and convenience unparalleled, always at command, and at small expense, as clean as need be. It is my duty to allude to it, however briefly. It will be seen, from Appendix A, of a profile line of levels, that the river, at high water, is about fourteen feet above the level of the swamps, and that the Draining Co. has actually drained five feet *below* this. So we have here upwards of fifteen feet from the level of some of our principal streets, in a distance of half a mile to a mile, for the most perfect system of drainage and sewerage that need be required. And it is a fact well known to us all, that boggy swamps that could not be passed through a very few years ago, by man, and scarcely by beast, and only inhabited by amphibious reptiles, are now high, dry, cultivated, and prepared for the residence of man, not only without consequences injurious to health, by the exposure of such a surface to the light of day and the winds of heaven, but greatly ameliorated by this increased ventilation. The moisture has sensibly diminished, and the ground has evidently risen (one of our oldest surveyors, who has been personally conversant with it for more than forty years, thinks) more

than ten inches. This invaluable company, which has accomplished so much, and can accomplish so much more for this city, was incorporated in 1835, and has been steadily pursuing its great destined object since, under numerous difficulties, with an intelligent engineer corps and directory. It has drained the First, Third, and part of the Second Municipalities, by digging extensive canals and ditches, to lead the water to their reservoirs, where are located their steam-engines, embracing in their range a certain section of ground, which is first levelled to prevent back water from the lake to reach it by the natural drains ; the water is now pumped out of these sections, from these reservoirs, into these natural drains, and thence flows to the lake. These extensive sections, embracing an area of over two miles in diameter, are now free from water, even soon after the heaviest rains ; and most of it is cleared and much built upon ; and with its proposed labours of drainage, and clearing the forest growth to the lake, will accomplish more for the comfort and salubrity of New Orleans than all other improvements combined, not excepting paving.

Most of the principal business streets, to six or seven blocks back from the river, are paved, and some of those perpendicular to the river much farther back ; it is done mostly with round stones, which, on such a subsoil, require constant expensive repairs in moist weather. The balance, or half the city, is unpaved, and is easily and soon cut up, in wet weather, by ordinary usage. Now the sewerage and drainage, properly conducted, would dry the subsoil, remove all offensive smells and sights, keep the lots and surface dry, and take off a very large proportion of the expense in cleansing and repairing the streets. It has already had so much effect on the burial-grounds in the rear of the city, that the dead can be placed under ground, where formerly you could not dig six inches from the surface without coming to water ; and, consequently, the dead had to be buried in brick tombs (or the coffins sunk below the surface of the water by boring holes in them), which, in this climate, in a few years give way, impairing the purity of the atmosphere. It would also make the climate more dry, and prevent all the consequences injurious to health, merchandise, business, or pleasure, from being in excess.

These wonderful results are destined to be carried out to their utmost extent, by our successors, by those who shall have grown wiser by our omissions, who shall be warned by the catacombs of victims our negligence (not poverty—not ignorance) has caused,

and who shall properly appreciate the inestimable position of New Orleans. It is notorious that all the large cities of America are underdrained, and also in England, and on the Continent of Europe, and so vitally important has it proved to be to health by most valuable experience, that it is notorious in many cities, where these drains exist, the inhabitants are almost exempt from fever, and where *they exist not, there is fever!* The towns along the river Po, the fens of England, and the low grounds of Holland, are all situated as New Orleans is, where the source of the water, and to which it is to be elevated, are all *above* the surface to be drained. If the indefatigable Hollander has seized from the ravages of the ocean, and the others converted swamps into rich fields, and appropriated them to the use of man, in comparatively inhospitable climes, and under governments where the rights of man are comparatively in their infancy, how much greater reason have we to appropriate from the "father of waters" a portion of the otherwise waste swamp—now, or but lately, a hotbed of disease, of the richest soil and finest climate in America, and under civil institutions, where man is blessed with every privilege he can enjoy.

The city is supplied by water, for potable purposes, by a company which was incorporated by the legislature in 1833, and began to furnish water to the city in 1837. It now has its pipes extended through various parts of the city, to the extent of thirty-seven and three-quarter miles. The engine by which the water is pumped from the river, is situated, with the reservoir, in the upper part of the city; the mound on which the basin is built is two squares back from the river, twenty-five feet above the adjoining streets; its area is 320 feet square, is divided into four compartments, each one successively supplying the city, while the sediment is being deposited from the others; it is capable of holding four millions of gallons of water, and the engine can pump up from the river daily, six millions of gallons of water. The cost has been upwards of a million of dollars.

There are yet but few manufacturing establishments here: one for cotton, several for spirit gas, one paper mill, extensive forges, and on the opposite side of the river several ship-yards, and floating dry-docks.

The city is well lighted with gas, and the pipes extend near thirty-four miles, at an original cost of \$800,000, and an annual expense of about \$100,000.

Probably no city is more bountifully supplied with aid for the sick

during epidemics; associations for their relief are extended with a true Samaritan spirit all over the city, and thousands upon thousands are distributed with no stinting hand. The large Charity Hospital is at all times open to those asking its eleemosynary assistance, and on an average of the last three years, near 9000 beneficiaries per annum have there found an asylum, with every appliance that humanity or science could desire, or charity ask for; and at an annual expense of about \$56,000 per annum, derived most appropriately, principally from a tax on passengers, balls, and places of public amusement. There are three private hospitals for the accommodation of the sick, besides an elegant U. S. Marine Hospital on the opposite side of the river, intended for the commercial marine.

There are two canals connecting the city with Lake Pontchartrain, the avenues of an extensive inland or coast commerce; and two railroads, one to Lake Pontchartrain, and the other to Carrollton, a town of about 1200 inhabitants, distant by the river about twelve miles; on the trajét of this road (about four miles) are fine seats for our wealthy citizens, and the country in the vicinage has numerous country residences for ease, health, and pleasure. The roads or drives in the neighbourhood of the city, during dry weather, are numerous and fine, and conduce much to health.

There are few subjects more cherished here than that primary one of education; receiving its impetus about eight years since, from the enlightened, intelligent zeal of Alderman Peters, and Recorder Baldwin, assisted by an intelligent municipal council, and public-spirited citizens. The holy feeling was ere long caught by our neighbours below—of the 1st, 2d, and 3d municipalities; and now the whole south of the city is, or may be, taught at the public schools, at the public expense. The system now works well; the rich and poor all receive together, the inestimable blessing of education; and here first imbibe that valuable practical political axiom of equality, as at the altar of their God. Commencing with a few scholars in 1841, there are now over 5000 in the primary, intermediate, and high schools; there are probably 1000 in private schools, and about 500 taught at their homes by private teachers. It may be seen how the value of this boon is estimated, when, according to the returned assessment, there were but about 10,000 of the proper age (between six and sixteen), in the school limits; it is then truly esteemed here a public blessing, and considered a sacred public duty to foster it; and, as such, it has been incorporated into the State Constitution. It may be mentioned, to the high honour of this young State, where

the easy accumulation of property is so constantly seducing one to mammon by its alluring temptations, that more money has been spent in attempts to foster the interests of education, in proportion to its white population, than any other in the Union. The revenue for their support is derived from a tax of one mill on every dollar of the cash value of property on the rolls, besides a poll tax; and there is spent in this city, for these purposes, about \$135,000 per annum. Libraries are being formed, attached to them, to foster and encourage a taste for reading, that admirable asylum, refuge, and protection against improper company; that of the 2d municipality already reaching upwards of 8000 volumes.

The vital statistics of New Orleans constitute a problem, and a very important one, that never has been solved; and I approach the subject with great humility and unaffected diffidence, statements having been made in relation to them, at variance with the now (I believe) ascertained facts; the true data have been heretofore wanting—the primary bases of all calculation, viz., the number of the living, and the number of the dead.

Of the first, we have to presume the U. States census for 1830 to be correct; that of 1840 (*the cause* of all the errors), we now know was not; a census was made in 1847;* it was partially correct only; the entire population *almost certainly* was not given; and then there were no details of ages, &c., and of course no basis for calculating the average age of the living; so I have taken these for 1830 as my basis, and calculated it at twenty-four years one month. In the census for 1847, none but strict *family residents* were taken; the thou-

* This is presumed to be as near correctness as we could acquire under the circumstances; by the U. States census of 1840, the population was stated to be 102,204; the over-estimate was supposed to have arisen from some vile political, or pecuniary purposes, and all the calculations in relation to the health, since, have been based upon it. To see how far this census differed from or corresponded with that of 1830, to find out where was the source of error (my only resource left), I calculated the average age of the living, according to it, to compare it with that of 1830, and found it differed but a few months, that of 1830 being as above, 24 years and 1 month, and this 24 years 10 months. It particularly becomes me to expose this vile fraud, because I have been made the innocent victim of propagating errors, in relation to the sanitary condition here, to the public, based on it, on which some reliance may have been placed, and I seize the first opportunity to wash my hands of the imposition. Nevertheless, error or not, New Orleans has been more rapidly on the increase than any large city in America, New York excepted, for, on the lowest estimate, it has been at the rate of 5.32 per cent. annually, since 1830; (the American portion, the 2d Municipality, more than doubling itself in twelve years!) while between 1830 and 1840, by the U. S. census, from the calculation of a friend, Philadelphia has increased 3.67 per cent., Boston 3.45, Baltimore 2.69, and New York but 5.81.

sands that count New Orleans their homes, and are occasionally absent, were left out entirely; such, we know, was not the case elsewhere. I have, accordingly, on the best advice, added only 5000 for this large population, to enable me to make my ratios as correct as possible.

But there is a large class, the floating population, not enumerated in the census, that furnishes a very large per centage of our annual mortality, estimated, by those best entitled to judge, to amount to between 20,000 and 30,000, adding probably about one-fifth to our mortality, as is proved by the returns from the Charity Hospital for the last eight years, constituting one-fifth of the entire mortality, those from Louisiana forming from one to three per cent. of the admissions; besides this, there is a large number of strangers who die here, that our cemetery records do not specify as "non-residents." By reference to Appendix D, it will be seen that I have merely corrected the census of that year by adding the small number of 5000, making it 100,028, and the mortality the average of eight years, 5177, or one in 19.82, embracing all the *yellow fever* cases I could ascertain, viz., 5910! embracing also some of the sickliest years that the city has known; to show how this varies, the mortality in 1845 was one in 33.07. I have added in that table various comparative data of other cities, which will not be found without their interest.

A still greater difficulty remains in relation to the dead. I have laboured many years to acquire something like truth and certainty on this subject, and I think I am entitled to the credit of rescuing from oblivion some ten or fifteen years of the records of mortality which had been *surreptitiously* made way with. I have collected now the mortality for about forty years; but then there is wanting those valuable details of special diseases, ages, and periods of residence, &c., which should give it its greatest value; to be sure, I have some of these, and must make the best use of them I can: but it is impossible, without procuring the requisite materials, to give that accurate estimate of the "expectation of life," or its "value," or such a view of the true sanitary aspect of the climate, which is so much needed by the statistician, the insurer on lives, or him who wishes to know the risks he runs in coming here before he ventures, nor does time permit me to use, in a proper manner, all the materials I have collected.

The vital statistics of this great city in embryo, and of course what may ameliorate it, are of the last importance to the citizen, the

patriot, and the philanthropist. I do not wish to dodge what may and must be considered a large mortality: but it is due to truth, to science, and to the place; to all those great interests involved—and not merely the local ones, to those who live here themselves, and expect to raise their families here, or those whose property is here, on whose proceeds they are luxuriating in other climes—but to more than half this great confederacy, who are deeply interested in this great entrepot, for which there can be no substitute—to make such explanations as to put fairly before the eyes of the public, and their servants and agents (the public authorities), to amend errors, correct defects, and to make such improvements as the country requires, and the climate (if bad) is susceptible of. Is this climate, then, *lethal per se*? does it belong to its position? and is it irremediable? Or, does it spring, in any measure, from habits and customs that are incompatible with the climate? These are questions of the last importance to us, to the American people, and to science. I enter into the very limited discussion of these great questions with a deep conviction that the facts demonstrating the convictions I feel are correct. I have fruitlessly sought everything bearing upon this subject for years, and though I have gathered sufficient to satisfy my own mind, and, I think, most that are open to the truth and unprejudiced; yet there are some gaps in my investigations, that may fail to produce on other minds that conviction arising from demonstration.

That diseases, or what may be called unhealthy years, occur in cycles of irregular return, is well known in the historical records of nations, in our country, as well as in others, and even among nations whose condition may be considered stationary; in many, they are doubtless much influenced by the agency of man; that various parts of our own country are being, and have been, constantly influenced by these means, is doubtless true: it is within my own recollection, and thousands now living, of various parts of our own State, where the mortality is now much less than half of what it was when passing through what may be termed its TRANSITION STATE, or that from its primeval, or forest state, to that fit for the purposes of man, and arrived at it, and made so by clearing, draining, and cultivating the land, is unquestionable. It is a general fact, that, as a country becomes cleared of its forest growth, and exposed to the influence of the sun, there is a diminished annual fall of rain; how it has been for the last four or five years here, I cannot say, from my own observations, as I have been absent—travelling,—but, upon a

comparison of journals kept here some forty years ago, and the recollection of the older inhabitants, compared with my own observations up to 1844, there is no doubt that this is true here also. Such experience is applicable to the whole of our western country, within the knowledge of the present generation, and that all our new States to this date, have been the graves of unnumbered thousands; nor is it to be now told, for the first time, that the pioneers of civilization are to be made the first victims to the numberless blessings *to be inherited* from their toils. Such, too, is the actual fact in relation to cities; old cities are wealthier, *cæteris paribus*, than new, and new parts of old cities are more unhealthy, generally speaking, than the old; new ships are often less favourable to health than those more old. Why, during this "transition state," there should arise a condition unfavourable to health, is difficult to say; numberless theories have been invented by the ingenuity of man to account for it; most of the hypotheses of the miasmatists have had their origin here; it is so much easier and more soothing to one's pride, if not conscience, to ascribe to some unknown, invisible agent, the cause of our diseases and afflictions, than to find fault with our own dear habits; that the various changes in all our various modes of life and our habits, the disrupture and vicissitudes to which all are thus subject, tending to destroy that balance and equilibrium on which a continuance of health so essentially depends, is much more probable, I have no doubt; for it would be almost impious to refer the greatly increased mortality to obeying one of the plainest of God's commands, that "of subduing the earth," and subjecting it to the purposes of man as a cause of disease! rather than to breaking his laws, and obeying our own passions and vicious inclinations.

That there is a peculiar air hanging over and through cities, or all great aggregations of human beings, is probable enough; indeed, every page of recorded time shows it; asthmatics feel it; the most sensible of our race feel it; children, delicate females, or those in delicate health: nay, who is insensible to the difference between country and city air? Let any one leave a city, and go a few hundred yards, on land or water, and particularly the latter, to sea, and he will be immediately sensible of it. This is independent of mere ventilation. I have myself often experienced it, and particularly during my heavy duties at Vera Cruz, when surgeon of the U. S. Army at that place during the summer of 1847, when, in attendance on the shipping off and near the harbour—immaterial which way the wind blew, from sea or shore—the peculiar feeling of

the stomach was not experienced until we reached some hundred yards from shore. There is an atmosphere about cities that is, in a great measure, very much independent of perflation, for an epidemic will commence and be continued during, and in spite of, a rapid wind blowing all the time; that this is not from simple putrefaction, is apparent; that it is independent of, in the very face of winds that should directly blow it away, and which seems to be constantly changing the atmosphere of the place; it does not exist most where all kinds of putrefaction most abound, as in barn-yards, cat-gut, and other manufactories, where animal and vegetable substances are constantly going through this process; in butcheries, swamps, &c. &c.; it exists concentrated in filthy hospitals, where many diseases originate; others can scarcely be cured for it; it is eminently rife in blind alleys, cellars, and dirty houses, where there is a stagnant air: it prevails to a great extent wherever there is a defect of domestic and personal cleanliness, and probably more from the latter, than the former. Now it is evident the nearer we make the condition of a city approach the condition of the country, the more likely it will be to enjoy that salubrity which it enjoys over the city.

To apply the results of this well-established principle to this city, it is but fair and just, that, until its neighbourhood shall be cleared, drained, and cultivated; the sub-soil kept dry by sewerage; the streets properly paved with flat stones; the glare of the sun or reflected caloric controlled by planting trees, and particularly in the wider and less business streets; wide sheds built over our great thoroughfare (the levee, where the mass of the business is done, and, in a great measure, by people unaccustomed to the climate); the refreshing current established in our gutters, with an efficient police, *with proper habits in the people*, a large mortality will inevitably ensue, together with such an occasional epidemic, with its devastating horrors, as will cast a lasting stigma on the salubrity of the place, and retard its permanent advancement to a prosperous and stable condition. When these improvements shall have been effected, I do not doubt its being made the healthiest large city in the Union, and, withal, one of the *pleasantest* places of residence. As yet, hygienic observances have done little for New Orleans.

The actual mortality of this city by ratios (now only correctly stated), as compared with other cities (in appendix D), is certainly very large;* but then it is evident, from the ages of those who die,

* "The exposure of the mortality of New Orleans, if made years ago, might have had the same influence as a similar discovery made through statistical records in Eng.

and from their short residence here, and from their course of life—not at all adapted to the climate—it is perfectly evident that the climate *per se* has less to do with it than other conditions. That man must mould his habits of living to the climate—or the climate to them—is as palpably evident as any proposition in Euclid; or that the same course of life is not equally adapted to all climates. Now, as it is somewhat difficult to accomplish the latter, he had better pursue the part of wisdom and discretion, and adapt himself to the former. “Mould to its manners his obsequious frame, and mitigate the ills he cannot shun.” Man, in fact, is the only animal that can adapt himself to all climates, and he does it by the exercise of that intelligence with which the Great Father of all has endowed him, by: 1st, exercising that great principle of TEMPERANCE *in all things*, characterized in the Holy Book as of such vital importance; and then, 2d, adopting the rational habits of the natives of the different climes to which he proposes to adapt himself. Now, with the native, or well acclimated population, the mortality is very small; to the two extremes of infantile life and advanced age, it is extremely kind; to middle life, the male sex, and the over-free, hard, and rapid liver, it is obnoxious. That all these are undeniable facts, the records will show.

To prove that this large mortality does not proceed from the climate necessarily, we have a most unanswerable argument derived from three sources. The first I shall mention, is to show the influence of temperance on it: “Civilization, which has done so much to mitigate the physical, as well as moral ills of life, and prolong existence, can hardly be debited, with but one exception to its innumerable blessings. The modern art of distilling spirituous liquors, which has put such an unfortunate facility in the hands of the mass, who have so little control of themselves, may, by

‘—— Eking from each infirmity that brings
Untimely age on us,’

be that exception. The public exposure of the evil, by the publication of the statistics of these societies, will open the eyes of the public to its magnitude, and force it to correct the evil.”

I have received, on application, an official document from G. W.

land and Massachusetts, by their invaluable registration laws, where situations supposed to be healthy (and who lives in a *sickly* place!!) were only found, by the corrected returns of the mortuary records, to be eminently the reverse, and by an examination into the causes and removal, a healthy condition may be restored.”

Powell, Esq., G. W. P. of the *Sons of Temperance* in this city, exhibiting the mortality among the members of that body during the two last most fatal years known to this city, when it has been scourged by the combined influence of yellow fever and cholera, with an acknowledged mortality from them, during the period which this document embraces, of 5653! Of the 2427 members, there have died in two years, to the 1st of April (that is, from their commencement to that date), but 29—or 1 in 83.41! This most valuable report goes on further to state in detail, that, of this mortality, 8 died of yellow fever, and 2 only of cholera—that about one-third of these deaths were of *transient brethren* visiting here for their health! And, moreover, that nine-tenths of all these members were of that *very age* (between twenty and forty) most subject to the supposed malign influences of this climate!

It is said that figures cannot lie. There is no need of it here, for this I consider but a fair exponent of the effect of the clime on those who live according to the dictates of reason and prudence (in other words, according to the rules of temperance).

The second proof I shall mention bearing upon this subject, is the influence of the climate upon that sex who are proverbially temperate everywhere. Of the large mortality by yellow fever during the last eight years, but about *one-seventh* were females! In relation to other classes of fever, &c., in this country, my own experience is equally expressive. Here, then, is another great proof, not only of the value of the principle, but a corroborating proof that the climate is not fatal *per se*.

3d. But there is still another. It is now a well-established fact that incarceration in prison most fully protects the inmates from the yellow fever. Insulation can act only in one way; it protects from disease by controlling the *habits of the individual*, subjecting him to that course of regimen prescribed by the rules of the place, utterly incompatible with any kind of intemperance.

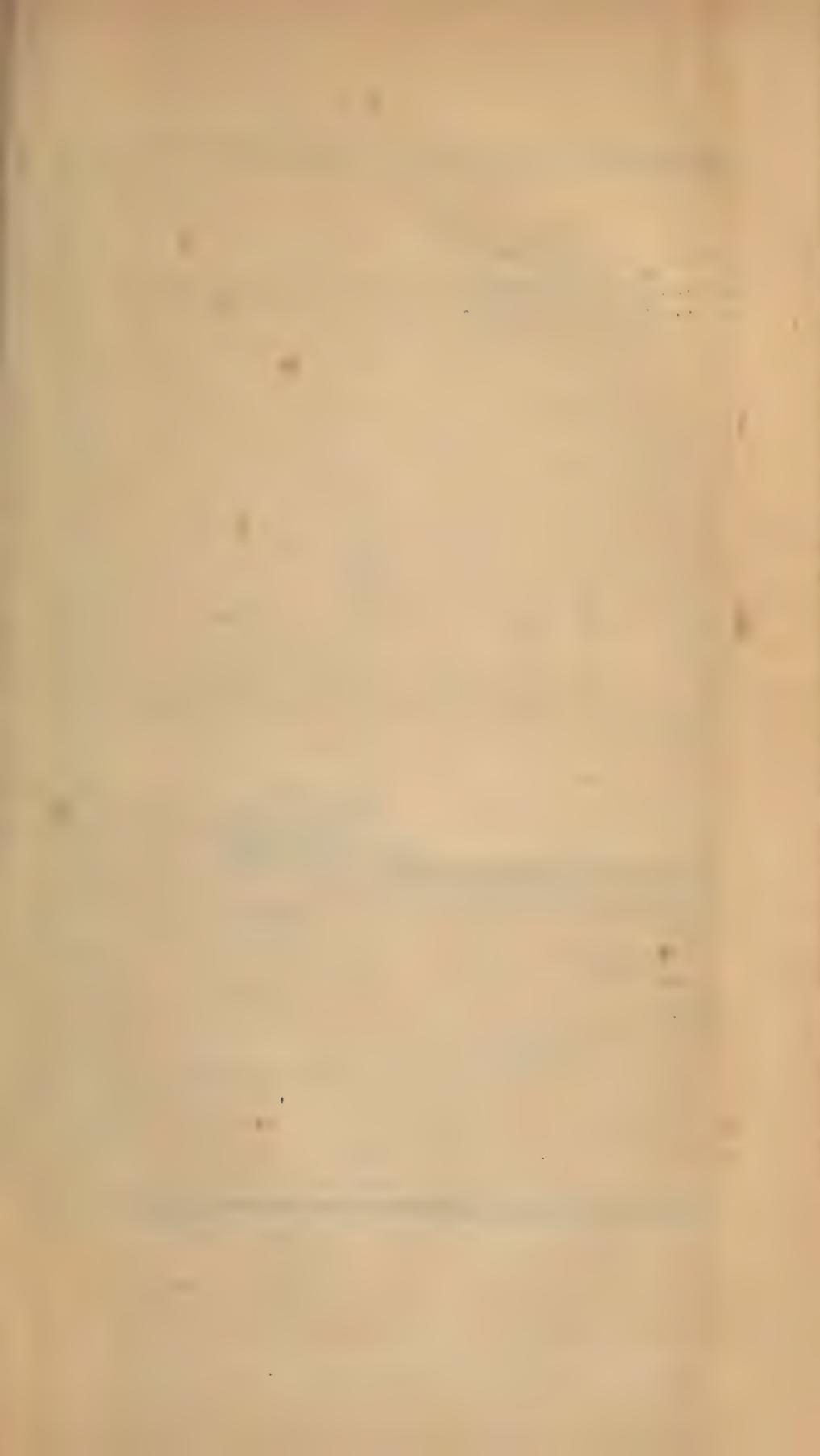
“In Mexico, the same immunity occurred with those incarcerated during the prevalence of cholera; and, from the *same cause*, scarcely a case occurred among the temperate in its present visitation in New Orleans.”

In all these cases, then, the same air is breathed by all, and they constitute a very fair test of the influence of the climate upon individuals who live regular, prudent, and temperate lives. I believe such is its actual influence on the mass of those here who pursue such rules as a guide of life. I consider that document furnishes

one of the most unanswerable arguments in favour of temperance and the climate that was ever published in this country, and is all that was wanting to put both upon their proper footing before the public.

Temperance is a common virtue in nearly all tropical countries; stimulants of various kinds are used, but they are not of the diffusible character of alcoholic drinks, being mostly of the class of condiments, supporting the action they excite. Mortality too soon follows in the footsteps of the inebriate for the natives of hot countries not to see the graves they would be thus digging for themselves: it is then mostly confined to the emigrants from northern nations who come to this country with the additional vigour of a more rigorous climate, who are alone able to stand it long; and with them, the mortality is greatly increased thereby. It is in vain to say—by those fond of indulging themselves—in the face of all these facts, that the free liver does not hasten his end. Thirty years' experience here, and in other more tropical regions, convinces me of its truth. All records go to prove it. My cotemporaries know full well, though this kind of life gives an appearance of fine ruddy health, that these appearances are deceptive; that they do not last many years; that ere long the system shows unequivocal signs of sinking, either by the occurrence of some form of stomach or bowel-complaint—by apoplexy, palsy, or some congenerous ailment, indicating the wearing out before their time of the organs essential to life.

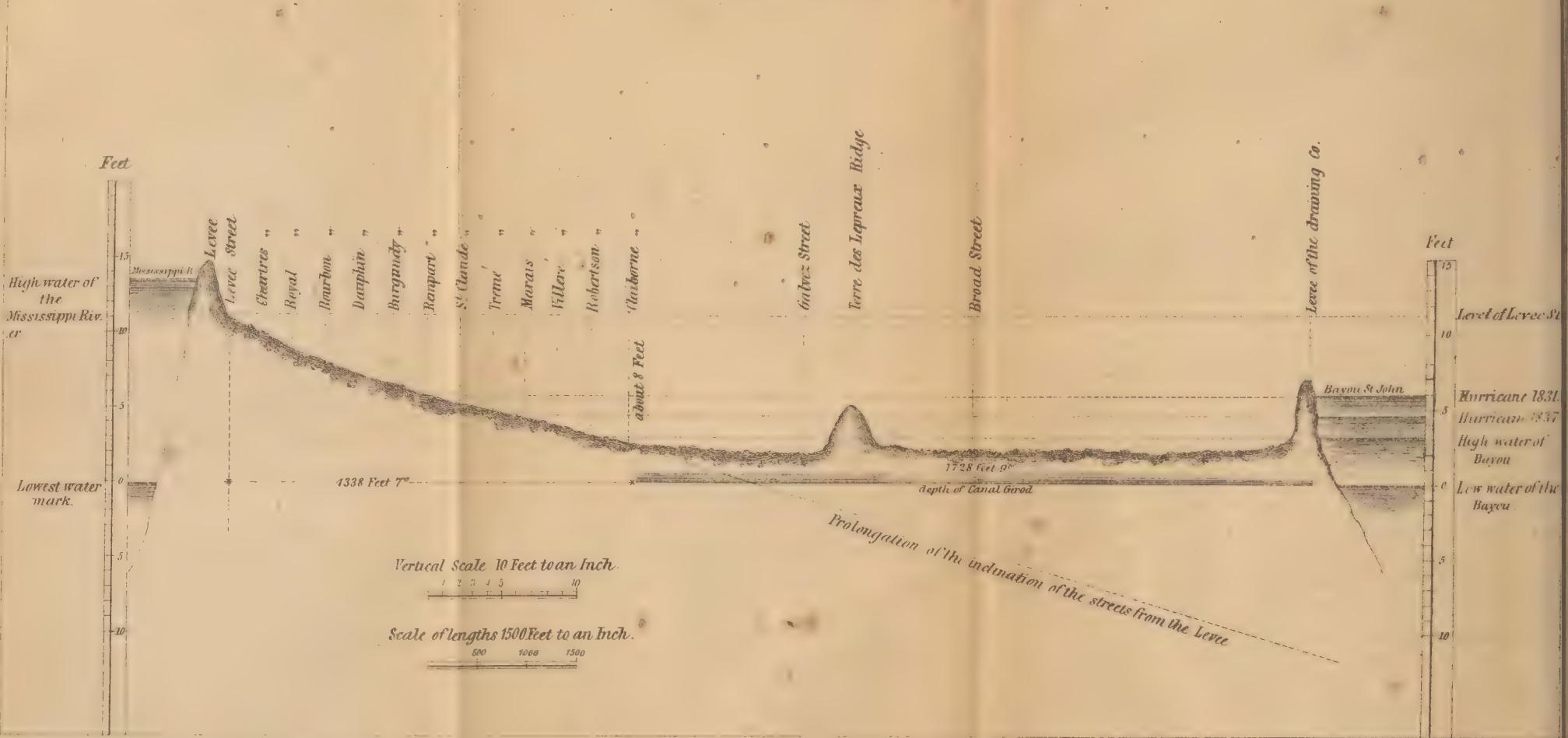
These are unpalatable and unpopular truths; but to my profession belongs the important, though disagreeable task, as sentinels on the watch-tower of health, not only to point out the mode of curing, but often the more important one to communities, to indicate, for the sake of avoidance, the source of danger. To my personal knowledge, the medical profession here for the last thirty years has done its duty, and done it at every hazard to fame, to life, and to profit; and if their advice had been followed, New Orleans this day would be nearly as long ahead of its present destiny. It was the opinion of our distinguished countryman, Dr. Rush, that the medical profession was about twenty to thirty years ahead of the public, in information in relation to health; in *that time*, the public usually becomes sufficiently enlightened to estimate the value of hygienic laws, observances, and improvements, from time to time recommended by the profession. If a present outlay of a few thousands is more valued than human life, that outlay will be more than tenfold repaid by the increased value of property, by increased population,



PLAN

of the Levels of the high and low waters in the Mississippi and Bayou St John, which leads from the back part of the City to lake Pontchartrain, and profile of the inclinations and rise of lands from the Levee to the Bayou.

New Orleans 3 February 1840 Chas. Lesseps.



and by a vast addition to our comforts.* If eternal vigilance is the price of liberty, why should it not be of health? I am fully aware that this country can never be entirely healthy, whatever may be its changes in its physical condition, *unless the habits of the people* are entirely adapted to it. I am not so Utopian as to believe that man will enjoy perpetual health, or live to extreme old age, anywhere; but the history of our species in all quarters of the globe, and at all times, will serve to show to the unprejudiced observer, that that great blessing is rather the reward of his adherence to the laws of hygiene than of external conditions, though these are of great importance, and essential to enable him to carry out, and put in execution, some of the most important laws of hygiene, and especially in relation to dryness and moisture, ventilation, and exercise.

* These important truths now find universal acceptance. "Whatever preserves health, serves society; for sickness, besides its vexation, occasions a loss of property and a loss of time, and often it involves both the property and the time of others."—*Ensor, London, 1818.*

APPENDIX B.

THERMOMETER.
4 observations per diem.BAROMETER.
4 observations per diem.

MONTH.	THERMOMETER.												BAROMETER.																	
	3 observations per diem.						3 observations per diem.						3 observations per diem.						3 observations per diem.											
Jan.	53.04	57.70	53.53	52.18	74.33	33.	53.2- 41.	10.59	30.193	30.113	30.123	30.103	30.460	29.790	30.117	.63	6-21	19.66	41.89	16%	7%	5	10.220	7	4.3	7%	1%	2		
Feb.	53.57	63.16	59.44	55.92	74.33	37.33	57.93	37.	10.59	30.140	30.143	29.823	30.127	30.456	29.560	30.146	.66	69.42	29.51	50.92	38.91	17%	8%	2%	6.800	3.2	1%	2%	3%	3
Mar.	60.12	71.14	65. 1	62.92	78.06	51.	65.00	27.66	8.68	30.096	30.040	29.916	20.956	30.326	29.823	20.996	.60	72.57	32.03	39.13	35.34	19%	9%	2%	4.906	4	2%	7%	3%	4
April	61.76	70.25	70.34	68.54	82.66	57.33	69.17	25.33	10.27	30.110	29.943	30.090	30.066	30.273	29.933	30.040	.35	74.77	48.92	67.67	29.18	21	3%	1%	4.918	2.3	6%	4%	6	2
May	69.30	80.47	73.82	72.37	84.	59.	74.23	28.	8.29	30.110	29.910	30.063	30.113	30.326	29.900	30.006	.43	75.92	53.67	67.83	22.5	27	3%	1%	2.963	3	7%	2%	4%	3
June	74.37	83.7	78.65	73.78	87.66	10.	77.82	17.66	9.98	30.146	30.060	29.936	30.113	30.240	29.800	30.100	.44	78.57	61.67	73.7	13.69	33	3%	3%	3.954	1.2	7%	3	5%	3
July	77.89	83.90	79.06	79.09	89.33	72.66	79.80	16.66	7.44	30.143	30.090	30.136	30.146	30.226	30.036	30.143	.19	80.28	72.33	75.77	7.95	16%	6%	2%	5.900	3.1	5%	5	8	1
Aug.	75.20	84.35	79.30	77.33	87.66	69.	78.82	19.	8.60	30.160	30.113	30.132	30.116	30.266	30.020	30.093	.24	78.95	65.99	74.59	11.99	21	4	3%	5.813	4	6	3	2%	5
Sep.	72.22	80.70	76.17	74.61	88.	63.66	75.99	21.	9.41	30.150	29.570	30.056	29.983	30.190	29.930	30.006	.25	78.07	59.92	73.47	18.49	17%	8%	2%	3.930	1.6	11%	2%	3%	1
Oct.	62.98	74.06	68.03	66.61	80.66	47.	67.64	34.35	10.82	30.110	30.056	30.123	30.113	30.376	29.923	30.113	.48	76.20	44.69	61.53	34.9	24	4%	2%	2.840	9.2	9%	4%	11%	1
Nov.	51.16	62.95	56.26	53.57	75.66	34.	55.92	41.66	11.99	2 yrs.	30.100	30.026	30.190	30.443	35.796	30.206	647	70.73	31.16	52.04	39.58	22	6	2%	2.370	7	1%	2%	2	3
Dec.	46.50	57.95	51.42	47.62	73.66	34.33	51.91	40.	11.60	30.195	30.183	30.165	30.160	30.443	29.986	30.190	.497	62.26	31.34	46.54	30.92	19	8%	3%	4.690	8.2	8%	3%	6	2
																		30.072	4.33					245	72	29	58.664			
																		67.22	29.10	9.93										

ASPECT OF THE
WEATHER.
3 observations per diem.HYGROMETER.
Once a day—at
midday.

3 observations per diem.

MONTH.

AVERAGE at
sunrise.AVERAGE at
midday.AVERAGE at
sunset.AVERAGE at
midnight.GENERAL
range.

3 observations per diem.

MONTHLY
range.MEAN for
the month.MEAN for
the month.

3 observations per diem.

MONTHLY
range.MEAN for
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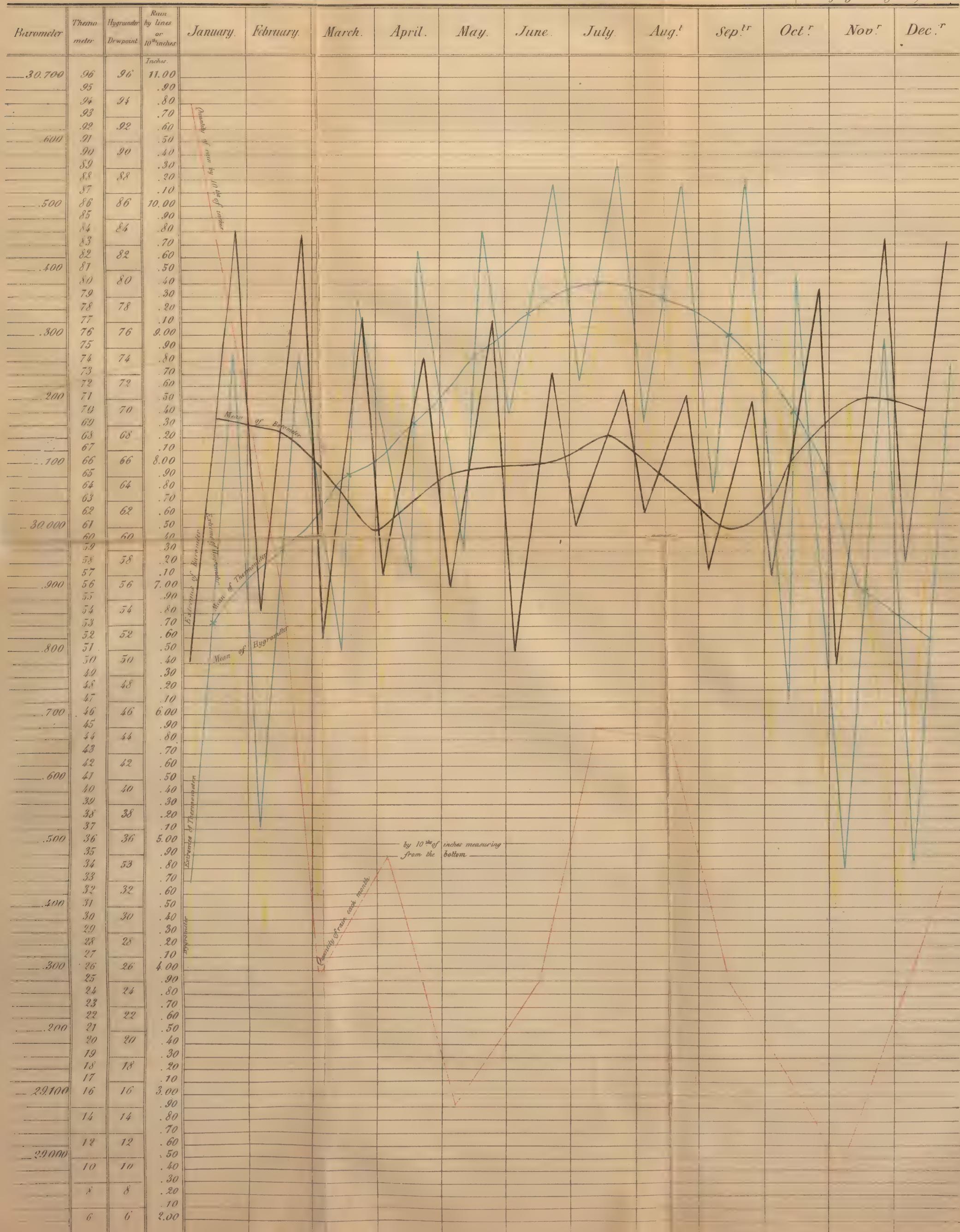
3 observations per diem.

MONTHLY
range.MEAN for
the month.MEAN for
the month.

THE METEOROLOGY OF NEW ORLEANS.

The Black lines indicate the Barometric Movement
 " Blue " " " " Thermometric "
 " Yellow " " " " Hygrometric " or Dewpoint taken once a day at midday
 " Red " " " " the monthly quantity of Rain in lines, or $10^{th}s$ of inches.

(Average of three years.)



APPENDIX D.

CITY.	Population.	Year.	Average age of the living.	Year.	Ratio of deaths to population.	Year.	Average age at death.	Year.	Average annual deaths.	For No. of years.
Boston	114,366	1845	23 5	1845	1 in 45.87	1845	20 3	1845	1,919	10 yrs.
New York	421,791	1846	23 1	1840	27.83	Dr. Stevens	18	1846	11,069	1 yr. '46
Philada.	101,345	1845	24 1	1840	48.92	1845	19 11	1845	5,881	'45-'46
Baltimore	124,331	1848	Whites 23 1	1840	29.37	1848	19 9	1848	3,258	10 yrs.
Charleston	29,261	1840	Whites 24 3	1840	48.36	1840	35 11 $\frac{1}{2}$	1848	.739	'35-'45
N. Orleans	100,028	1847	Whites 24 1	1830	19.32	1841-1848	26	'41-'48	5,177	'41-'41
Havana	162,508	1841	Whites 28		35.67	1841			4,568	8 yrs.
Vera Cruz	5,500									'36-'46
Mexico	170,000				27.76	1844	24 6	1846	6,122	10 yrs.
U. States			22 2							1844

N. B.—In some of the cities, the population is estimated by adding the ratios of increase, where known. Of Vera Cruz and Mexico, I have seen no publication of the census; I was then told what I here state.

The calculations have been made in great haste, and under many disadvantages. Mr. B. W. Cohen, of this city, has much aided in those relative to this place; and a kind friend, who would blush to see his name in print, has lent me much aid with the others. I have tried to make them *correct*. In the haste necessarily attendant on the entire preparation of this report, during a severe epidemic, I could only fill up its details by snatches of anxious moments, and it is thrown upon the charitable indulgence of my compeers.

APPENDIX E.

Statement of the Winds, in New Orleans, by Months and Seasons.

AVERAGE NUMBER OF DAYS BLOWING FROM THE RESPECTIVE POINTS OF THE COMPASS.

BY MONTHS.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	
January	6	3½	6½	3½	3	2½	2½	2½	Being on an average of 8 years, viz., from 1835 to 1842, inclusive.
February	3½	2	5½	3½	2	3½	1½	4½	
March	3½	2	6½	3½	6½	2½	1½	2½	
April	1½	2½	7	4½	6½	2½	1½	3½	
May	2½	2½	6	4½	5½	4½	1½	2½	
June	1½	1½	5½	4½	4½	6½	2½	1½	
July	2½	1½	5	6	6	4½	3½	1½	
August	3½	3½	4½	4½	3½	4	2½	2	
September	5½	5½	6½	2½	2½	1½	1½	2	
October	6½	5½	6½	1½	1	0½	1½	3½	
November	8	3	4½	3½	2½	1½	1½	3½	
December	7½	3½	6	2½	2½	1½	2½	4½	
BY SEASONS.									
Winter	6	3	6	3	2½	2½	2	4	Average number of day's winds each month of the season.
Spring	3	2½	6½	4½	6½	3½	1½	3	
Summer	2½	2½	5	5	4½	5½	3	2	
Autumn	6½	4½	5½	2½	2	1½	2½	3	
Winter	17½	9½	17½	9½	7½	6½	6½	11½	Total number of day's winds each season.
Spring	7½	6½	19½	16	18½	9½	4½	8½	
Summer	7½	6½	14½	15½	14½	14½	8½	5½	
Autumn	19½	14	17½	7	5½	3½	4½	8½	
Winter	2d	5th	1st	4th	6th	7th	8th	3d	Relative frequency of each wind during each season.
Spring	6th	7th	1st	3d	2d	4th	8th	5th	
Summer	6th	7th	2d	1st	3d	4th	5th	8th	
Autumn	1st	3d	2d	5th	6th	8th	7th	4th	
BY THE YEAR.	2d	5th	1st	3d	4th	6th	8th	7th	Relative frequency of each wind during the year.
Actual No.	51½	36½	69½	47½	45½	34½	24½	34	

Total number of days noted having been 342½.

APPENDIX F.

Comparative Statement showing the Proportionate number at each interval of Ages, in every 10,000 Living, in Louisiana, America, and England.

AGES.	United States.	Louisiana.	New Orleans.	England and Wales.	United States.	Louisiana.	New Orleans.	England and Wales.
Under 5 years	1744	1933	1239	1324				
5 and under 10	1417	1476	1205	1197				
10 " 15	1210	1217	940	1089				
15 " 20	1001	1032	949	997				
20 " 30	1816	1882	2158	1780				
30 " 40	1160	1215	1756	1289	{ 3708	3753	4924	4028
40 " 50	732	656	1010	959				
50 " 60	436	347	433	645				
60 " 70	245	169	192	440				
70 " 80	113	54	81	216				
80 " 90	32	14	27	59				
90 and upwards	4	4	8	5				
100 and upwards		1	2					
	10,000	10,000	10,000	10,000				

H.—10.

Letter on the Sanitary Condition of Louisville, Ky.
By L. P. YANDELL, M. D.

LOUISVILLE, March 15, 1849.

DEAR SIR: I avail myself of my earliest leisure to reply to the questions proposed to me in your circular letter. In doing so, I shall not have it in my power to submit as many statistics as I could have wished to lay before the Association; but some of the facts which I shall be able to present have an important bearing upon public hygiene, and will not, I trust, prove wholly uninteresting to the profession.

Louisville, in Kentucky, is situated on the south bank of the Ohio River, at the Falls, lat. $38^{\circ} 3'$ N., long. $80^{\circ} 45'$ W. from Washington City, on a beautiful plain, seventy feet above low water-mark, stretching back, and gently declining from the river. The plateau is constituted of sand and river gravel, intermingled with a tenacious clay, and reposes upon a friable shale, analogous in character to the Genesee, State of New York. The disintegration of this slate has imposed upon the Louisville plain its peculiar features. Everywhere, this rock forms a surface remarkable for its evenness; and the soil which it produces, as it crumbles under the action of the air, frost, and water, is peculiarly retentive of moisture. Ponds and slashes are abundant, wherever the black slate constitutes the surface rock.

The first houses erected at the Falls, were built in the midst of ponds. Entire squares of the city are now pointed out, which occupy the ancient beds of ponds, large, and deep enough to float a steamboat. These have all been drained, and such collections of water are now nowhere to be seen within the city limits. But, south of the city, and extending twenty miles to the mouth of Salt River, is a district of country known by the ominous name of the "Pond Settlement," which is still but partially reclaimed. The traveller, as he pursues the public road in the direction of Nashville, sees on either hand a continuous chain of shallow ponds, until he reaches another formation, beyond Salt River.

Louisville is a flourishing city. In 1780, it contained a population of only thirty souls; and in the next twenty years the number of its inhabitants had increased to but six hundred. In 1820, it had reached four thousand; in 1830, ten thousand; now it may be stated at fifty thousand souls.

The bed of the river, at the Falls, is composed, of the uppermost strata, of the gray, or cliff limestone, which, as well as the slate superimposed upon it, belongs to the Devonian system. The gray limestone is a compact rock, and its hardness at this point is increased by the immense infusion of fossil remains, chiefly corals; and the result is, that it yields slowly to the abrading action of water. The black slate originally overlapped it here. It is of a soft structure, and is rapidly worn away by the stream. In these facts, we have an explanation of the Falls. The river has washed away the destructible slate, and its current follows the dip of the resisting limestone. The coral reef, and the superposition of the slate at this point, may be stated as the cause of the Falls of the Ohio.

The plateau, which forms the site of the city, having a gentle slope from the river, gives a slight current to the water, which falls upon the surface, and slowly drains the ponds. No rock is near the surface, and consequently ditching is effected with facility. It has been carried on to a considerable extent; but much in that important line remains to be done.

Louisville, while it stood amid its ponds, was regarded as one of the most sickly towns in the valley of the Mississippi. It was commonly called "the graveyard of the west." It is now esteemed one of the most healthy. Intermittent fever was a regular annual visitant; and occasionally a form of bilious fever prevailed, rivalling yellow fever in malignity, and threatening to depopulate the town. The most fatal of these endemics broke out in the summer of 1822, after a hot, rainy season. The number of victims from it, out of a population less than five thousand, was 232.* In a family, consisting of twenty persons, nineteen were sick at one time, and in some families, every individual died.† At this time, only one street in Louisville was paved, and within its limits were at least eight ponds of greater or less dimensions, most of which, in the course of the autumn, were dried up, exposing foul bottoms to the sun.‡

* Dr. J. P. Harrison, Philad. Med. Journ., vol. viii.

† Collins' Kentucky, p. 364.

‡ Dr. J. P. Harrison, *op. citat.*

Ten years after this fever had prevailed with such fatality, cholera appeared in Louisville. From the severity with which it had been visited by fevers, the citizens expected the approach of this pestilence with painful forebodings. But cholera proved milder in Louisville than in any of the neighbouring cities. Indeed, it hardly at any time assumed an epidemic character. When at its height, the daily average number of deaths from it were only about seven, as reported by the Board of Health. In Cincinnati, three hundred and fifty-one fatal cases occurred in twenty-seven days. On one day, forty-two persons died, or one out of every six hundred inhabitants then in the city. In Lexington, the mortality was still greater. This town, with a population not exceeding six thousand, lost five hundred of its inhabitants with cholera. In a single day, sixty deaths occurred, which was one to every hundred of its population, and one to every fifty actually in town. These facts are striking. It is not pretended that they establish the superiority of Louisville over its neighbours in respect to health. In the progress of cholera a second time, to which we are looking forward, the fate of the three cities may be reversed; but the statistics afforded by its former prevalence are worthy of being noted.

No fever approaching in malignity to the endemic of 1822, has ever since appeared in the city, nor, indeed, had one ever before appeared of so fatal a character. The citizens were awakened by this visitation to the importance of taking some measures for the removal of the causes of disease, and not long afterwards a system of internal improvements was instituted, which has been in operation ever since. The ponds have all disappeared. The streets have generally been paved, and though the grading is defective, and can never be as effectual for drainage as it might be rendered on a less even surface, still it is such as to carry off the rains into the river, and the ditch south of the city. In most of the gutters, water stands for some time after a rain, and, becoming green in the summer time, presents a forbidding appearance. But the quantity which thus collects in any one place is small, and I am not aware that disease has ever been traced to this source.

The only parts of Louisville obnoxious to the charge of unhealthfulness are its suburbs. Beargrass, a small, sluggish stream, with alluvial banks, which empties into the river at the foot of Third Street, taints the air in its neighbourhood. The ponds send up their

* Dr. Drake, *Western Journ. Med.*, vol. vi. p. 67.

effluvia from the south; and the extended rock of the Falls, laid bare by the retreating river in dry seasons, exhales the poison of intermittent fever. The inhabitants along Beargrass, and of Water Street, and of the scattered dwellings in the outskirts of the city, are sorely afflicted with this fever. Now and then, a season passes without its occurrence; but it is looked for by people in these quarters, as well as by the residents of the country in the neighbourhood, as a regular visitant in autumn. The cause, however, is giving way, year by year, and the time is probably not far distant when the Pond Settlement will be reclaimed, as Louisville has been, from the dominion of malaria. The infected circle is receding. In 1837, it was not deemed safe to reside nearer the limits of the city than Walnut Street. Now Chestnut Street is considered healthy. As we go from the suburbs towards the crowded parts, the chances for health increase; and as the new streets are built up, a barrier to the fever poison is thrown around the older neighbourhoods. Hence, up to the present time, the growth of the city has been tending continually to increase its salubrity.

The streets and alleys are cleansed by hand, and with nearly equal care; but, owing either to the imperfection of the system, or to the inadequacy of the force employed, it would certainly be difficult to find anywhere more uncleanly lanes and thoroughfares than Louisville exhibits. The refuse from the houses is deposited in the streets and alleys, and, with the filth produced by every other cause, is allowed to accumulate in heaps, until the period comes around for the carters to haul it away. One of the first things that strikes the eye of the stranger is the neglected condition of our streets. He wonders how Louisville can be healthy, with such masses of putrescent matter in its midst. It may be doubted whether, in this respect, Louisville does not compare disadvantageously with any city of equal size in the country.

The streets of the city are wide, and cross each other at right angles, which secures the most perfect ventilation, and favours their drying fast after rains. Many of the alleys are closed at one end, and on some of these a number of poor families reside who experience the evils of confined air, in addition to the discomforts arising from the filth that must accumulate around their crowded dwellings. The houses of the poor are generally bad; not only small and badly ventilated, but built, the first floor on, or near the ground, so that they are damp and unwholesome. In the poorer quarters of the city, a family is generally to be found occupying each apart-

ment of a building, and from five to ten persons will often be met with in a room. The houses, though so constructed as to prevent a free circulation of air, are so open as to expose the inmates to cold in winter, and when fuel is dear much suffering is experienced from this cause. They are warmed, for the most part, by stoves; but the more improvident poor are not supplied with this comfort, and such use open fireplaces.

The public schools, twenty-four in number, are open to children at the age of six years, and all are crowded. The system is one which calls for reform in several particulars. Too many scholars are congregated in a room, either for health, or for mental or moral improvement. In some, there are as many as 130; and in none, less than 60. The largest rooms are not forty feet square, and many are of much smaller size. The children are kept in them from three to four hours in the morning, and two and a half to three hours in the afternoon. The long vacation is in summer, and lasts six or seven weeks. The health of the children is good. The number of teachers in the several schools is too small. It is not possible for the children to take exercise in the small yards connected with the schools, and they are consequently forced into the streets to enjoy it. Louisville, by a fatal oversight, neglected to provide grounds, when she might, for the exercise and recreation of her children, and now the opportunity has passed away. Fortunately, her streets are so wide that, planted as they are with fine trees, this evil will not be so sorely felt as it would be in cities less happily constructed. Broadway, when graded and set with trees, according to the plan which has been commenced, will afford a promenade as beautiful as could be desired.

The Louisville Marine Hospital is the only receptacle for the sick in the city. It is a well-constructed charity, under the control of the city council, where marines especially are received and attended to, and clinical instruction is given to the students of the medical school. The means for ventilation in it, as well as in the other public buildings of the city, are effectual. In all the churches, the upper window-sashes can be lowered, in a way to afford circulation of air without draughts upon the congregation.

The city is supplied with water from wells, which are from forty to sixty feet deep. After passing through beds of sand and gravel, a layer of tough clay is reached, upon which the water rests. It is largely impregnated with the salts of lime, especially the carbonate; and, in some of the more ancient wells, gives evidence of an old and

crowded settlement. There has been, for several years, a project entertained for supplying the city with river water. Abundant as is the present supply, and excellent as is the quality of the water in most parts of the city, it is clear that the time is approaching when we must look to another source, and we are admonished, by the deterioration of the water on the first settled streets, that it is near at hand.

From the statements given, it will be seen that the only prominent source of disease in the vicinity of Louisville is the marshy surface formed by the black slate, and that this source is being gradually dried up. It will strike the observer with interest that the health of the city has gone on improving, *pari passu*, with the draining of the country. No doubt it would be better if the streets were more thoroughly cleansed, if the drainage were better; if less water stood upon the surface and in the gutters; if the houses of the poor were better built, and better ventilated; if there were open squares for the exercise of old and young; if we were supplied with pure water from the river: but, as we have seen, Louisville has been visited with no malignant fever for more than a quarter of a century. Cholera came in a form less fatal than that in which it appeared at Cincinnati, and far less than that in which it prevailed at Lexington. Typhus and typhoid fevers, which have been prevalent in those cities, and in many parts of the country, continue up to this day comparatively strangers here; and cholera infantum carried off more children in St. Louis in a week, a few summers since, than it did in Louisville in a month. My experience enables me to compare this city with Lexington, and with Nashville and Murfreesborough, in Tennessee; and I have no hesitation in saying that, as a residence for children, it is preferable to either of those towns. It would be difficult, indeed, to find a city where a more numerous infant population is exhibited on the streets, or where the children, in their ruddy complexions and vivacious movements, give better proofs of high health.

Some years since, I drew the attention of the profession to the fact that, in the spread of cholera over the western country in 1832, and 1833, it was particularly fatal in those places where a limestone rock is the prevailing formation.* I have already alluded to the fact in this communication, and will simply add, that I have not been able to learn that the pestilence was fatal in any locality where

* Western Journal, vol. vii. (new series), p. 152.

the surface rock is sandstone or slate. If, in its future progress, the disease should be found to conform to this law, the fact will acquire great importance. In casting his eye over the country, Louisville, with its flat marshy surface, is the spot upon which the etiologist would have fixed as the one where cholera would exhibit its highest virulence, while Lexington had every prospect of escaping the pestilence. Lexington and Cincinnati, Versailles, Nashville, and Shelbyville, Tennessee, are all upon the same limestone, and cholera was fatal in all. New Albany, four miles below Louisville, on the opposite side of the river, but on the same geological formation, afforded only a few cases of the disease.

Very respectfully, yours,

L. P. YANDELL.

LOUISVILLE, *March 15th, 1849.*

H.—11.

Letter on the Sanitary Condition of Cincinnati.
By J. P. HARRISON, M. D.

JAMES WYNNE, M. D.,
Chairman of Committee on Public Hygiene of the American Medical Association.

DEAR SIR: In answer to the questions submitted in your circular of May last, I beg leave to return the following replies:

Question 1.—Population 110,000; the city is situated on the northern bank of the Ohio River; on the south, it is bounded by steep hills of ancient fossiliferous rocks, and on the eastern and western boundaries the hills jut in, leaving a space of only about two hundred yards free, between them and the river. The city stands on two terraces, the lower of which is liable to be inundated in very high floods of the river. These terraces are composed of sand, gravel, and loam—the deposited materials of a long prior overflow of the river. The soil is alluvial; the sub-soil sandy and gravelly. The city is favourably placed for rapid drainage, the water escaping along the streets from the upper and lower terraces to the river.

Question 2.—The character of the town in reference to health is very good. Near the White Water Canal, which runs through a part of the city, along the lower terrace at the west end, ague and fever is somewhat prevalent in autumn. There is but little bilious remittent fever seen within the limits of the town. In the more crowded parts, especially among our German population, cholera infantum is very fatal during the hot months. This fatality is attributable to two influences: crowded and ill-ventilated apartments, and indigestible aliment.

Question 3.—The streets and alleys are laid out generally for surface drainage; there are but few sewers; the drainage is not well accomplished in all parts of the city.

Question 4.—The streets are cleansed by scavengers hired by the city authority; but the streets are not kept in as clean a state as they should be; the courts and alleys are cleansed whenever the streets are; the refuse from the houses, such as kitchen refuse and ashes, is thrown into the streets; the hogs devour what they will, or can, and the remainder is taken up by the scavenger carts about every three weeks. The street manure is thrown on the wharves to extend accommodation to the river landing. It is very rarely carried into the country, as the soil does not require any kind of manure.

Question 5.—The streets are wide; the ventilation free. There are only two or three courts or alleys built up and closed at the end. The houses of the poor are generally good; but, as in all cities of any magnitude, too many persons among the poor occupy the same building. Among the Germans especially, eight or ten families are seen to occupy the same house—a family in each room. This is not common among the native portion of our population. The houses of the poor are warmed by stoves or grates, in which the bituminous coal of Pittsburgh and of other points below that city on the river is burnt. Wood is burnt by some few families in air-tight stoves. Among the more wealthy families, the stone coal is consumed in grates, or the houses are warmed by heated air from cellar furnaces.

Question 6.—The system of public schools is founded on entire freedom, without any payment of fees, supported by a public tax. The teachers are efficient in every sense; the children well taught in the common elements of a sound English education. The children are allowed certain periods of the day for exercise, half an hour being given them, for that purpose, between the regular school hours. They are received from seven to fifteen years of age. The rooms are large, well aired, with good pitch of ceiling—in brick buildings especially constructed for the accommodation of a large number in each edifice—four large rooms in each edifice. During July and August, vacation is allowed; perhaps during six, but I think, eight weeks.

Question 7.—There is but one hospital, the Commercial Hospital, which receives the boatmen from our steamboats, and other river craft, as well as the sick poor of the city. There is an appendage to the hospital, called the Pest House, to which small-pox patients are taken; this building is in a distant spot, with no dwellings near

it. The township trustees, who, by law, have the oversight of the hospital, appoint four physicians not attached to the hospital, who attend the poor at their houses. These physicians receive an annual remuneration from the township trustees. The public buildings are well ventilated. There is no provision for public grounds or squares.

Question 8.—The town is supplied by hydrants from a large reservoir, filled by steam-worked machinery; the Ohio River, above the city, supplies the water. It is liable to become turbid in winter, but is very clear during the summer; it is abundant and salubrious.

Question 9.—Our municipal regulations are pretty good; neither very stringent, nor altogether void of effectiveness; on the whole, rather leaning to the side of laxity.

Very respectfully, yours, &c.

JOHN P. HARRISON.

CINCINNATI, Dec. 4th, 1848.

H.—12.

The Yellow Fever Quarantine at New Orleans.
By E. D. FENNER, M.D.

JAMES WYNNE, M. D.

DEAR SIR: Your favour of the 20th of May last, informing me that I had been honoured by the American Medical Association with an appointment on the Committee of Public Hygiene, came duly to hand, and at once prompted the determination, on my part, to undertake the task. But, little did I then know what difficulties and interruptions I should have to contend with. Since that time, I have passed through an epidemic of yellow fever, and what might be called two epidemics of cholera, all which has so completely occupied my time as to render it impossible for me to comply with your request in a satisfactory manner. I regret this the more, as the occasion presented by the close of the Mexican war, and the return of about thirty thousand men from that country, afforded such an admirable opportunity to investigate the point to which you have invited my special attention, viz., the *contagion of yellow fever*. In view of the task before me, I made ample memoranda of the principal facts presented, but am now under the disagreeable necessity of cutting you off with a few brief extracts from my journal, and adding some general remarks on the subject. A more full detail of such information as I have obtained will perhaps appear in our medical journal at a future time, or in a contemplated work on the yellow fever of New Orleans.

You inform me that "the Sanitary Report of New Orleans is confided to Dr. Barton"—and request that I will "examine and report upon the subject of yellow fever, with the view of showing how far it may be affected by hygienic measures, and what advantages or disadvantages result from our present quarantine regulations."

I am pleased to learn that my worthy colleague has performed the task assigned him, and I doubt not his report will be read with interest. Dr. Barton has long been familiar with the topography

and diseases of New Orleans and lower Louisiana, and ought to be as well qualified as any one in the State to make a report concerning them.

A difference of opinion has ever existed respecting the nature and origin of yellow fever at this and the neighbouring places where it has prevailed for a little more than half a century past. Whilst some have contended that it is a *specific disease*, introduced from the West Indies into New Orleans towards the end of the last century, when Louisiana was a colony of Spain, others, comprising some of the ablest and most experienced observers, have been perfectly convinced that it is only *one of the forms of endemic malarial fevers* occurring at irregular intervals. One party contends that it may be spread or propagated by means of *infection* or *contagion*. This is unequivocally denied by the other. At the same time, there is a third party which entertains some of the opinions belonging to both.

For some time past, I have been endeavouring to trace the history of yellow fever from the time it first made its appearance in New Orleans. I have not yet finished the investigation; but from the lights before me, I am inclined to believe that it never prevailed here previous to the year 1793. In some old historical records, there is a vague allusion to it at an earlier date; but our full and reliable accounts only extend back to the period mentioned. I have recently conversed with five most respectable, wealthy, and intelligent old gentlemen, who settled in this city about the beginning of the present century, that is, from 1797 to 1804. They all say the disease was spoken of familiarly when they first came here. One of them (Col. Manuel White, who came here in 1801) recollects well a prevailing opinion that yellow fever was a disease brought into New Orleans from the West Indies, not many years previously. Another (Mr. Joseph Saul, who came in December 1803, and established the first branch of the old United States Bank) says he was intimately acquainted with Dr. Robert Dow, an eminent Scotch physician, who had then been practising medicine in this city for fifteen or twenty years, and he recollects distinctly having often heard Dr. Dow remark that, *previous to the year 1793, he had never seen at this place any other than the ordinary intermittent and remittent bilious fevers of southern latitudes, and that they readily yielded to mild treatment*; but that, in the year mentioned, being the same as that in which Philadelphia was so severely scourged, yellow fever made its appearance in New Orleans, and continued afterwards to do so at irregular intervals. Dr. Dow continued to practice here till

about the year 1824, when he returned to Scotland, and there lived nearly twenty years longer. Mr. Beverly Chew came here in 1797. He recollects hearing much of the yellow fever in 1794 and 1796. He speaks in the highest terms of Dr. Dow. Mr. McDonough and Mr. Parkwood, who settled here before the purchase of Louisiana, have recently given in statements similar to the foregoing. All these intelligent old gentlemen, who have lived here so long and seen so much of the disease, had long since arrived at the conclusion that yellow fever *originates in this place, and is not contagious.* These opinions are maintained by all the early medical writers on the yellow fever of New Orleans, whose essays I have been able to find. Without going more minutely into the progress of the disease at this place, a subject on which I might greatly enlarge, let me proceed at once to the consideration of *hygienic measures and quarantine regulations.*

My worthy colleague, Dr. Barton, will doubtless lay before the Association all the information that may be desired respecting the topography and sanitary condition of New Orleans. He will probably show that, although much has been *incidentally* done in the way of improvements, *much more* remains to be done before we can hope for any decided mitigation or expulsion of our city's great scourge. In fact, hardly anything has ever been done *expressly* with the view to improve the health of the city. All the improvements that have been made within the last twenty-five years (and they have been both extensive and costly), were almost exclusively designed to facilitate commerce and business. But you wish to know of me "how far yellow fever may be affected by hygienic measures?" When I look around me, and see a large number of people living but a short distance off, exposed to the same sun, winds, and rains, drinking the same water, eating nearly the same food, and yet *exempt* from yellow fever, I can but imagine that much might be effected. The inference is irresistible that there must be *something within the city* which gives rise to the morbific cause. Nor can I abandon the belief that *what it is* may, by diligent search, be discovered and removed.

As for the *old delusion*, that yellow fever is brought into New Orleans from the West Indies, Vera Cruz, or any other place, and might be kept away by quarantines, I need only say that the experiment has long since been fairly tried, and it signally failed. It is but fair to admit, however, that we still have amongst us intelligent men, who believe in the efficacy of quarantines, and are anxious to

see the experiment tried again. So recently as 1847, the legislature had the subject before it, and came near adopting the measure. Fortunately, it failed, and I trust the experience of the last two years will serve to explode the idea altogether. The following is a summary of the legislation in this State on the subject of quarantines, as far as I have been able to ascertain:—

The first act is dated March 17th, 1818, and is entitled "An act to establish a Board of Health, and Health Office, and to prevent the introduction of malignant, pestilential, and infectious disease into the city of New Orleans." This act provides for the establishment of quarantine, a lazaretto, &c.

The second act was passed on the 6th March, 1819; repeals the first act, and orders the sale of the lazaretto, and everything connected with the quarantine establishment.

The third act was passed on the 17th February, 1821, and is entitled "An act to provide against the introduction of infectious diseases," &c. This act again constitutes the Board of Health, and establishes a quarantine ground.

The fourth act was passed on the 19th February, 1825; repeals the last act, but gives the City Council power to pass quarantine laws.

So far as I have as yet ascertained, the City Council has never passed any laws on the subject; and thus quarantine regulations were permitted to sleep until the winter of 1847-8, when another ineffectual effort was made to revive them. It has been said that the quarantines of 1818 and 1821 were not rigidly enforced, and therefore did not afford a fair experiment. On the contrary, I have heard that they were most rigidly enforced, and only abandoned when they were found to be utterly useless.

In connection with this, I may be permitted to give you some information respecting the operation of quarantines at Natchez and Vicksburg, two towns or cities on the Mississippi River, above New Orleans. There are two villages between Natchez and Vicksburg, viz., Rodney and Grand Gulf. The first epidemic of yellow fever that ever prevailed at Natchez occurred in 1817. Since then, it has prevailed at irregular intervals (one as long as twelve years), though "there have been a few cases almost every year," according to the testimony of Dr. S. A. Cartwright, a distinguished practitioner of that place.

The first epidemic that ever prevailed at Vicksburg occurred in 1841. Since that time, there have been two or three epidemics, but

so mild as to cause doubts amongst some of the physicians of the place as to their being true yellow fever. It is not denied, however, that, among the few that died each year, were several well-marked instances of *black vomit*. The village of Rodney was scourged by a severe epidemic of yellow fever, for the first time, in 1843, and by a milder one in 1847. Grand Gulf has, so far, been entirely exempt, excepting such cases as were brought there on steamboats, and these have occurred every year when the disease prevailed in New Orleans; but no instance is known of its having been communicated to the inhabitants of the place.

I am informed that, about the time quarantine was first established at New Orleans, it was likewise established at Natchez, and in like manner abandoned, after a few years' trial. In 1841, it was again established, and has continued in force, as occasion seemed to require, ever since; but I have the best authority for saying that, during the time (a period of eight years), scarcely a year has passed without presenting a few cases of yellow fever, and in some a considerable number.

After the severe epidemic of 1841, quarantine was established at Vicksburg, and has been maintained ever since, with results very similar to those at Natchez.

There has never been any quarantine either at Rodney or Grand Gulf. As before stated, yellow fever has prevailed at the former place, but never at the latter.

Bayou Sara and St. Francisville, two villages on the Mississippi River, about half way between New Orleans and Natchez, present some curious and interesting facts in relation to yellow fever. I cannot do better than give you the following extract from a letter I received from Dr. P. B. M'Kelvy, one of the oldest and most respectable physicians in that region. The letter is dated *St. Francisville, March 20th, 1849.* The Dr. says:—

“I recollect but one case of yellow fever before the autumn of 1839, which was brought here from New Orleans, and died. No other cases occurred. In 1839, the fever prevailed to an alarming extent. How it originated, I cannot say; but the *first* recognized case was a man by the name of Banta, a resident of the place. This epidemic was confined to *Bayou Sara*. No case occurred on the *Hill*, or in St. Francisville, three-fourths of a mile distant from the river bank. One case, however, died in St. Francisville, having been brought from Bayou Sara. From that period until 1843, I do not remember having seen or heard of a case. In 1843, the

epidemic seemed to be confined to this village (St. Francisville). No case occurred under the Hill or at Bayou Sara, that I know of. A remarkable peculiarity attended this epidemic: although there were many persons residing in the village but partially acclimated, no individual was attacked or died but those who were *creoles* of the parish or State, or had resided here for many years. I was not able at that time to trace the origin of the disease beyond the precincts of the village. The same year they had the fever in Woodville (1844); we had four cases here, originating in that place; three recovered, one died; he had the black vomit when he arrived, and lived but a few hours. *No other cases occurred.* In 1846, I recollect one case brought from New Orleans early in the season—that is, he was taken with the fever a week or ten days after his arrival; *he died.* Some five or six weeks subsequently, an epidemic of a very mild type broke out simultaneously here and at the Bayou—only two bad cases, one of which died. *Neither of them had been in any way exposed to any other than local causes.* 1848. One case originated here—had not been out of the village or to the city for some months; unacclimated; *died.* No other cases. During the periods embraced in the above remarks, the intercourse between this place and Bayou Sara, on the river bank, and between that and New Orleans, was free and uninterrupted at all times."

For the information of the reader, I may state that the village of Bayou Sara extends from the water's edge to a hill in the rear. St. Francisville is located on the high grounds directly back, not quite a mile distant. No quarantine has ever been established at these places. A semi-weekly line of packets runs constantly between them and New Orleans, to say nothing of the immense number of steamboats always running on the river.

It is a well-known fact that, since steamboats first began to run on the Mississippi River (1812), thousands of instances have occurred in which persons who had contracted yellow fever in New Orleans, travelled away on these boats, and either died amongst the passengers, or at some of the various landings along the river as high as the mouth of the Ohio. Yet the first epidemic of this disease ever known above this city occurred at Natchez in 1817—the first at Vicksburg in 1841, and the first at Rodney in 1843. At the same time, it is not to be denied that a few remarkable instances have been presented, in which the disease broke out at small towns in the interior of Louisiana, commencing from the arrival of cases just from New Orleans. My time will not allow me at present to exam-

ine the connection, whether dependent on *consequence* or *coincidence*.

In 1844, there occurred an extraordinary epidemic of yellow fever at the little town of Woodville, situated in the interior and southern part of Mississippi, some forty or fifty miles from the river at Bayou Sara. In the first volume of the *New Orleans Medical Journal*, may be found full accounts of it from the hands of Dr. A. R. Kilpatrick and Dr. C. H. Stone. These gentlemen took antagonistic grounds as to the origin of the disease. The former contended that it was *imported* in the person of a transient Methodist preacher, who had recently arrived there from Galveston, Texas, passing through New Orleans, at both of which places yellow fever was prevailing to quite a *moderate extent*. On the other hand, the latter contended that it was evidently of local origin. To say the least, it would appear very strange that a disease could be transported a distance of five or six hundred miles by sea and land, in the person, or summer wardrobe, of a Methodist preacher, and thus propagate itself in a place where *such a disease never prevailed before*; whilst *four cases* went from Woodville to St. Francisville, where the disease *had prevailed before*, only about forty miles distant, and yet *failed to spread amongst the inhabitants*; as has just been shown by Dr. McKelvy.

I have received from Dr. William McCraven, of Houston, Texas, some interesting information concerning the beginning and progress of yellow fever at that place; but am compelled to withhold it till a future time.

Let me now return to New Orleans, and briefly allude to such facts bearing on the contagion or infection of yellow fever as have fallen under my own observation since the year 1841, in the latter part of which I came here to live. In this year, there was a memorable epidemic, and the few believers in the importation of yellow fever contended strenuously that the disease was brought from the West Indies on board the ship "Talma." I have not before me an account of the attendant circumstances; but, on inquiry, I found that but few persons believed that the disease was introduced from abroad, whilst the great majority, as well physicians as intelligent citizens, entertained no doubt that the breaking out of yellow fever about the time the "Talma" arrived with sick on board, was *a mere coincidence*. It was just about the time the epidemics generally commence here.

We had moderate epidemics in 1842, '3, and '4. I made it my

special study, and noted carefully the facts attending the commencement of the disease each year. I am compelled to withhold them at present for want of time, but I declare to you that *I saw nothing calculated to sustain the position that the disease was imported in those years.*

In 1845, there was a complete exemption from yellow fever. There may have been a single case of doubtful character admitted into the Charity Hospital.

In 1846, there were about one hundred and sixty deaths from yellow fever. The disease made its appearance very late in the season, and partook very much of a typhoid type—hemorrhages and black vomit, in some instances, occurring as late as the eleventh and fourteenth days. In the history of yellow fever, this year should be memorable as the first of the Mexican war, and on account of the extraordinary circumstances attending it.

In the third volume of the *New Orleans Medical and Surgical Journal*, Nos. 2 and 3, you may find some memoranda of passing events, made at the time, to which I beg leave to refer you. It will there appear that, during that summer, which was remarkably wet and warm, about 15,000 men from the interior and upper country passed through this city on their way to the seat of war on the Rio Grande. Most of them were necessarily detained here about two weeks, commencing a camp life and exposed to very bad weather. In the month of August, about *six thousand* Louisiana volunteers, not one-fourth of whom, perhaps, had suffered yellow fever, were discharged, and sent back from Mexico. The city was a perfect thoroughfare for unacclimated persons; and notwithstanding all this, there was but little sickness. It fortunately happened to be one of our healthy years; otherwise the mortality must have been terrific. Intercourse with the West Indies, where yellow fever was pretty bad this year, was uninterrupted; but we had no access to Vera Cruz, and there was no yellow fever on the Rio Grande. So much for 1846.

In 1847, we had one of the most extensive epidemics that ever scourged our city. In the fifth volume of the *New Orleans Medical and Surgical Journal*, No. 2, Sept. 1848, may be found a rude account of this epidemic, to which I beg leave to refer you for particulars. In the month of March, the famous city of Vera Cruz, generally considered the favourite abode of yellow fever, succumbed to the victorious arms of our commander, General Scott, and was

retained by us till the close of the war. The main body of our forces being directed to that line, which led on to the city of Mexico, Vera Cruz necessarily became almost as great a thoroughfare as New Orleans. The new levies were constantly pouring in that direction, whilst the sick and discharged were likewise returning. Now the advocates of *imported infection* were confident of witnessing a brilliant illustration of their position; whilst the impartial seeker after *truth* was glad to have such an opportunity for investigation. I can only here briefly mention the result, having carefully noted all the first cases that occurred in this city. Notwithstanding the great and continued intercourse between Vera Cruz and New Orleans, yellow fever prevailing at the former place all the time, but few cases were brought over to this city, and the most careful inquiry I could make, did not bring to light *one single instance in which it was communicated directly to any person either in New Orleans or Lafayette*, a town joining us above. This position is fully sustained by our Board of Health in its published proceedings, as follows:—

“*Meeting of the Board of Health, Monday, July 12th, 1847.*—
 *** * * * Five deaths from yellow fever have occurred in the Charity Hospital, and two or three cases are still under treatment in that institution. They appear to have originated in the city, and no facts have come to light to prove any connection between these cases and the fever prevailing at Vera Cruz or other foreign ports.

(Signed) “W. P. HORT, *Chairman.*

“A. HESTER, *Secretary.*”

I regret that my time will not allow me to report some of the interesting facts on which this opinion is based.

I come now to the last year, 1848, which derives especial importance from the facts that in it the Mexican war was brought to a close, and that between the 1st of May and the middle of August, our whole army, numbering about *thirty thousand men*, returned home—the greater part passing through Vera Cruz, and nearly all coming directly to New Orleans, *without affording a single instance in which yellow fever was communicated from one person to another.* I do not hesitate to say, that I can bring the united testimony of the army medical staff engaged here, to substantiate this assertion. I have full memoranda of the principal circumstances attending the return of our army and the sickness of the season, which I hope to publish in the July number of our Medical Journal.

It may not be considered irrelevant to the subject under consideration to make some allusion to the various forms of *fever* which usually prevail at this place. In the *New Orleans Medical and Surgical Journal*, vol. v. No. 1 (July, 1848), may be found some statistics compiled from the books of the New Orleans Charity Hospital, showing the monthly and annual admissions of the different forms of fevers for a period of seven years, 1841 to 1848. From that paper I extract the following concluding remarks:—

“From these tables, it appears there were admitted, of all kinds of fever, 19,445 cases—of which 9991 were marked ‘intermittent.’ Add to which 26 cases marked ‘pernicious’ and ‘malignant intermittent,’ and 257 marked ‘congestive’ (which is a form of intermittent), and you will have 10,274 intermittent, or *more than one-half of the whole amount by 1103.*

“The following table will show the relative prevalence of what is marked ‘intermittent fever,’ at the different seasons of the *same seven years*:—

	Spring.	Summer.	Autumn.	Winter.
1841	112	403	177	92
1842	119	453	394	135
1843	85	208	413	137
1844	117	469	732	231
1845	180	358	664	206
1846	236	569	1045	218
1847	391	508	691	602
Totals	1240	2963	4116	1621

“Is it not curious to note the gradual increase and decline of intermittent fever at this hospital, and also the remarkable fact that this form of fever is *never entirely absent? not even at the zenith of the worst epidemics of yellow fever!* In August, 1847, when there were admitted 1611 cases of *yellow fever*, there were also admitted 74 cases of *intermittent*.

“Two interesting questions here present themselves, viz., *What portion of all this intermittent fever really originated in New Orleans? and in what part of the city did most of it occur?*

“The city of New Orleans is certainly a *great thoroughfare*; and has a larger transient or floating population perhaps than any other to be found. It is accessible by ships, steamboats, and land car-

riage. It is surrounded by a low, level, and very fertile country, having a large number of free white labourers. This class is engaged in the country principally in draining wet land, and, to some extent, in the mechanic arts. About the city, it is also engaged in draining the suburbs, but perhaps to a greater extent in street labour, such as paving, draying, loading and unloading ships and steamboats on the levee. Their residences are chiefly in the newer and more retired parts of the city, where rents are cheapest; but they are also interspersed amongst those of the wealthier classes.

“Now the Charity Hospital is opened *gratuitously* to all indigent invalids, male and female, white or coloured; and there is no obstacle to admission. This charity is only offered to the *indigent*; but *pay wards* are provided for those who are able to afford a moderate compensation.

“I believe it has been established that the poorer classes suffer everywhere more than any others from all kinds of fevers. Such is certainly the fact here, where the usual *exciting causes*, such as intemperance, exposure to the hot sun, &c., are very potent. The records of the Charity Hospital do not afford any precise information as to the length of residence in New Orleans. The question is asked, and the time stated; but the clerk informed me that he made no distinction between a residence in the city proper and the neighbouring country. The house surgeon and one of the clerks gave the opinion that most of the cases of intermittent fever occurred amongst the labourers in the suburbs and vicinity of the city. But the truth is, the labourers on the levee, streets, and canals furnish the greatest number of *all kinds of fever* at this place. My own opinion is, that those localities within the precincts of the city which afford the greatest amount of intermittent fever, also afford the greatest amount of remittent, bilious, and yellow fevers; moreover, that *they are all closely allied affections*. * * * * *

* * * * * “One more reference to the statistics, and I have done. It appears that the total admissions of *all diseases* into the main building of the Charity Hospital, during the above stated period of *seven years*, was 45,713—of which 19,445 were for *fevers*; and of these last, 10,274 were for the different forms of *intermittent fever*.”

Here necessity compels me to close my report, leaving me to regret that I have not been able to perform the task assigned me with more satisfaction both to you and myself. Having attended

the first National Medical Convention, which met in New York in 1846, I have ever felt a deep interest in its proceedings, and would gladly contribute anything in my power towards the accomplishment of its great objects.

I have the honour to be, with high regard,

Your obedient servant,

E. D. FENNER.

To JAMES WYNNE, M. D., *Chairman of the Committee
on Public Hygiene, American Medical Association.* }

NEW ORLEANS, La., April 16, 1849.

H.—13.

On the Influence upon Health of the Introduction of Tea and Coffee in large proportion into the Dietary of Children and the Labouring Classes. By SAMUEL JACKSON, M.D., Professor of the Institutes of Medicine in the University of Pennsylvania.

THE attention of the Committee was directed to an investigation of the influences exerted by the extensive introduction of tea and coffee into the dietary of children; and also the effects produced on the health of the labouring classes by the substitution of those luxuries for food.

In the above proposition, the facts assumed, it is believed, do not require the verification of statistical evidence, which could only be procured by considerable personal sacrifice and labour. They are matters of constant and familiar observation to every one, and are daily forced on the attention of medical practitioners. The large consumption of tea and coffee in this country tends to corroborate indirectly the statements asserted. In no other country, in proportion to population, is it as great as in the United States.

It is well known to be the custom of our people, that, as soon as children are able to sit at meals, they are placed at the family table, and partake of the same food as adults. The food especially adapted to the digestive organs and the nutrition of children, when it is provided as often occurs, is, however, the exception to the general rule. In the poorer classes, the evil of a common diet for all ages cannot probably be avoided. It is one of the causes productive of the greater mortality of the children of the poor. But this injurious practice, which with the poor is to be regarded as an inevitable misfortune, is followed by those who are placed in circumstances above the necessity of it. In them it is most condemnable, and can be excused only on the plea of ignorance and want of thought.

It is a subject of not less notoriety that coffee and tea are employed extensively, as articles of food, by various classes of our

population. Tea, coffee, and bread are the breakfast and supper; and tea, bread, and potatoes, with occasionally a modicum of meat, are the dinner of thousands in every portion of our country. They are the food of children as of adults.

The classes in which this kind of alimentation prevails are female teachers, seamstresses, factory women, weavers, tradesmen, small retailers, clerks with families, and others living on restricted means, and very generally farmers in the country.

The inducement for its adoption is its economy, as to money, time, and fuel. A meal of coffee or tea, and bread, or the addition of potatoes, for a small family, will not cost beyond a few cents, while it requires but little fuel and a very short time for its preparation. Tea and coffee are, besides, very palatable, produce temporary exhilaration and force, and abate hunger. Coffee, as will be shown, is not devoid of some nutritive properties. Ostensibly answering, in this manner, the purposes of food, tea and coffee have, from the considerations of cheapness and convenience, become the substitutes of more substantial diet.

In this country and England, chiefly, tea and coffee are introduced into the daily meals as aliment. In China, tea is used as a refreshing and cordial beverage, presented to visitors, or drunk between meals; in the East, coffee is regarded in the same light, and employed in the same manner; on the Continent of Europe, coffee is extensively used, but more as a cordial drink, or to flavour cream and milk, than as aliment.

In prosecuting this inquiry, with a view to the effects, on the economy, of tea and coffee, some preliminary matters require previous examination.

Every one knows that food is indispensable to life. But what is this connection between them? How is it that food is an indispensable condition of life? The solution of these questions is necessary to the understanding of the nature and objects of food, to determine the value of any alimentary articles, and to settle the pretensions of any substance for a place in the category of food.

Before examining the relation existing between food and life-action, it is important to obtain an accurate idea of what is life, or organic action. This term we limit to a single series or class of phenomena. These phenomena are the evolution or production of specific organizable matter and definite organic forms, from a primary, formless, organic substance. Albumen is that substance in man and the

higher animals. All other phenomena are excluded. They are subordinate to, depend on, but are indispensable to maintain life-action.

Organized tissues, and organs worked out by life-action, are the instruments of life. They differ widely from each other. Each has its special office. The phenomena of each are special in character and purposes. They are the same as similar phenomena in the exterior and inorganic world. They can be properly understood and studied only in their connection with those phenomena. Some are chemical, as the transformation of albumen, the processes of digestion, secretion, and the oxidation of carbon and hydrogen in the blood producing animal heat. Others are physical, as the capillarity of tissues, imbibition, endosmose, atmospheric pressure, and Graham's law of the diffusion of gases, in respiration; others are dynamic, as the excitor, motor, and other forces of the nervous system; others, again, are purely mechanical, as the actions of the muscular system.

Not one of those is properly an organic or life-phenomenon. They are indispensable to maintain the condition of the existence of life, or organic action. They are chemical, physical, dynamic, and mechanical actions, executed by organized and living apparatus and instruments, for the objects of life.

The organizable matter and organic forms are the products, and, consequently, the expression of existing forces or causes of action. Forces, matter, and form are indissolubly connected with, and give rise to, phenomena or function; and, inversely, function and phenomena are the correlatives of force, matter, and form. Organized matter, from its nature, cannot be persistent. Under normal states, force, matter, form, and function or phenomena, are permanent; but the structural material itself is not permanent—it wastes, decays, disintegrates, and is reproduced in every act of life. Life-action is thus resolvable into two inseparable actions, or links of one action, a birth and a death, the formation and destruction of the organic material of our structure.

The supply of the primary organic substance for this incessant renewal and building up of the organized structure, and maintenance of organic forms, is derived from the blood. This fluid, in its natural state, is a concentrated solution of all the solids and products of the animal economy. The amount of azotized or albuminous compound matter destroyed in twenty-four hours by life, or organic action, may

be taken, on an average, at two to three ounces.* The blood would rapidly become impoverished, and unfitted for life objects, unless its losses of albumen and its organic derivatives were constantly restored. The renewal of the organizable or plastic material of the blood, and its maintenance in its normal composition, for structural formation, is one of the offices of our food. Repeated analyses have demonstrated that, of the aliment that is adapted to healthy nutrition, one-eighth part only consists of albumen, or its protein compounds, or their derivative compounds; and, whatever is devoid of those substances—that is, the chemical combination of carbon, hydrogen, nitrogen, and oxygen, in the proportion to constitute protein ($C_{40}A_{30}N_5O_{12}\dagger$) or albuminous compounds—cannot perform the office of food, or be fitted for nutrition.

Another condition, not less indispensable to life-action than organizable or plastic matter in the blood, is a definite temperature. For man and the warm-blooded animals, the heat essential to healthy, vigorous life-action is 98° to 100° F. So important is heat to life, that nature has made provision for its constant disengagement in the economy. This is accomplished by the incessant oxidation of carbon and hydrogen in the blood. The temperature of this fluid is thus kept at an equable point in every part of the economy. Every organized molecule requires, for the exciting and sustaining of its life-action, the presence of plastic or organizable material, and a definite temperature.

The blood furnishes both these indispensable conditions of life-action to each living molecule.

The carbon and hydrogen oxidized in the blood, and in this manner generating animal heat, are obtained from the food. Nature has made most ample provision for the supplies of these chemical elements, by constituting them a large portion of the food of animals. Not less than from six-sevenths to seven-eighths of the alimentary substances of animals consist of non-azotized bodies. Fatty, starchy, and saccharine matters are of this character; they are not adapted to or intended for nutrition, but solely for the purpose of calorification, by their combustion or combination with oxygen introduced into the blood by the processes of respiration. This proposition is demonstrated in the composition of the alimentary portion of milk.

* Dumas, *Chimie Physiologique et Médical*, p. 463.

† Mulder.

The caseine, or plastic matter for nutrition, averages 13 per cent., the calorifacient, or the cream and sugar of milk, 87 per cent.

Temperature is required not only for life-action, but also for the dynamic forces, and mechanic power and actions seated in and performed by the muscular apparatus.

The identity of heat and mechanic force has been established by M. Joule.* It is expressed in the following formula: the heat required to raise one gramme (15 grains) of water one degree (cent.) is capable of raising 432 grammes (3700 grains) one metre, or $3\frac{1}{2}$ feet.

According to the estimate of Dumas, the quantity of carbon consumed by a man in good health (valuing the hydrogen by an equivalent proportion of carbon), averages from seventeen to twenty-eight ounces per diem. The large amount of heat thus disengaged is the sum of the dynamic or excito-motor force of the nervous system.

By the establishment of the above facts, we obtain precise ideas of the nature of food, its objects in the economy, and the modes of its operation. We are enabled to say with certainty what substances are or are not food; and to fix the relative value of each article of diet.

From these investigations, it is ascertained that alimentary substances form two distinct classes, differing from each other by the most striking diversities of nature, composition, and operation.

The first class are the protein or albuminous compounds. They have nearly the same chemical composition as the tissues, are isomeric with many of the immediate organizable materials of animal structure, and are exclusively destined to nutrition proper, or the reconstruction and repair of the solids.

No substance in which this especial chemical composition, protein and its compounds, does not exist, can belong to this class, or can be employed in the economy for its nutrition. Some of the most eminent organic chemists and physiologists appear to suppose that any organic nitrogenized body may answer for nutrition. This is not so. Morphia, quinia, strychnia, urea, taurine, as well as theine and caffeine, are organic nitrogenized bodies, yet cannot be ranked as food. It is the possession of the specific combination of which protein is the base, that can alone entitle any substance to rank in this class.

The second, or calorifacient, class of aliment comprehends those

* Comptes Rendus, tome xxv. p. 209.

special chemical compounds, hydro-carbons mostly, that are capable of prompt decomposition into carbon and hydrogen in the blood. No other organic substances, though rich in carbon and hydrogen, are capable of entering into this division of aliments.

The normal substances of this kind are glucose and lactic acid, into which saccharine and amylaceous substances are converted by the process of salivary digestion; and fatty matters, modified and reduced to the finest and minutest particles possible, in the emulsion formed with them by the pancreatic and biliary secretions.

This last class is the more immediately connected with the maintenance of life. It is established by the experiments of Chossat,* that death from starvation does not occur from inanition, or the waste of the organs, but from the cooling of the blood, from the absence of the carbon and hydrogen requisite to carry on the process of combustion and the generation of caloric.

With the preceding facts ascertained, we can now proceed to investigate the claims of tea and coffee to be regarded as properly belonging to either of the above classes of food.

Theine and caffeine, according to Liebig, are the essential elements of tea and coffee. The two are identical as to chemical equivalents. The formula for each is $C_8H_5N_2O_2$. M. Payen, in a later and more elaborate examination, gives a somewhat different formula, but not such as to vary their properties to any extent. Liebig considers them as closely approximating to alloxan, $C_8H_4N_2O_1$, a principle obtained from urea, by the action of concentrated nitric acid; and to taurine ($C_4H_8NO_{10}$), a principle which may be obtained from ox bile, but not from human bile.

In this view, tea and coffee must be excluded wholly from the classes of aliments, to which theine and caffeine can have no pretensions.

But M. Payen, in 1846, in a communication to the Academie des Sciences,† presented a highly laboured and accurate examination of the proximate constituents of coffee, which unquestionably brings it, at least, into the category of aliments, as it contains the constituents of both classes.

The following is his analysis of coffee:‡

* *Recherches Experimentales sur l'Inanition*, Paris, 1843.

† *Comptes Rendus*, tomes xxii., xxiii., 1846.

‡ *Ibid.*, tome xxiii., f. 249.

Cellulose	-	-	-	-	-	-	-	34
Fat substances	-	-	-	-	-	-	10 to 13	
Glucose, dextrine, and an indeterminate vegetable acid	-	-	-	-	-	-	-	15.5
Legumin, caseine (gluten)	-	-	-	-	-	-	-	10
Chloroginate of caffeine and potassa	-	-	-	-	-	-	3.5 to 5	
Azotized organic matter	-	-	-	-	-	-	-	3
Free caffeine	-	-	-	-	-	-	-	0.8
Insoluble, concrete vegetable oil	-	-	-	-	-	-	-	0.001
Fluid, aromatic essence of sweet odour, and a less soluble acrid aroma	-	-	-	-	-	-	-	0.002
Mineral substances, potassa, lime, magnesia, phosphoric, sulphuric, silicic acids, and a trace of chlorine	-	-	-	-	-	-	-	6.697
Water	-	-	-	-	-	-	-	12.
								100

From this composition of coffee, it is evident the grain is endued with nutrient or plastic and calorifacient elements, and, consequently, is an aliment; yet the proportion of these elements is not sufficient to place it in a high rank in either class, or to justify the substitution of its *infusion*, as a chief material of food, by those who are engaged in active and laborious pursuits.

But, when the quality of the weak infusion almost generally used as food, and the consequent very small proportions of the alimentary elements held in solution in it, are taken into consideration, the disparity between the waste of the blood, and the elements for its reparation contained in coffee, become strikingly displayed. The ordinary coffee of the labouring and industrious classes is little more than warm water coloured and aromatized by coffee. It contains but a very small portion, if any, of the nutritive and calorifacient elements. It is impossible, with such diet, to maintain in the blood the two indispensable conditions of life-action and nerve-force, organizable material and heat.

Coffee, to be prepared as food, should be first but slightly roasted, merely browned and rendered crisp, so as to be easily reduced to a coarse powder. A concentrated infusion is then to be made by the process of displacement. There should be added to it an equal, or double its quantity of cream or good milk, and be sweetened with sugar. An alimentary drink is thus prepared, possessing all the requisites of good food, with the addition of a specific excitant action

on the nervous system and brain that entitles coffee to the appellation bestowed on it by Rousseau, "boisson intellectuelle."

The ordinary miserable preparation of coffee so extensively used as food, deficient in proper alimentary principles, by taking away appetite, by distending the stomach with a warm liquid, and thus impairing its digestive power, and by its agreeable aroma corrupting the taste, rendering more nutritious food unpalatable, tends to the ultimate impoverishment of the blood. This fluid loses its proper character, that of a concentrated solution of all the organic elements and products of the economy.

As a consequence of this condition of the blood, the waste of the tissues exceeds the repair; death-action is stronger than birth-action; disintegration of structure predominates over its re-formation. In time, this loss of balance tells: the organs are degraded from their primitive type; their functions are impaired, and the organism descends in the scale of development. There is an approach to inferior organisms, and to cold-blooded animals; or, rather, the system is kept permanently in what constitutes the cold stage, or tendency to collapse in febrile diseases.

In this state, individuals suffer from a variety of vague, anomalous symptoms, characterizing no definite disease. They are always ailing, complaining, suffering, but not absolutely sick. They are miserable themselves, a plague to doctors, the prey and victims of quacks.

In this condition of the economy, the temperature is low. Dynamic force, which is identical with heat, is equally depressed; and, consequently, the mechanic or muscular power is at zero, and the offices of the economy depending on it are imperfectly performed. The circulation is feeble, digestive movements slow and defective; languor and exhaustion prevail. Exercise augments the evils by expending the forces more rapidly than produced, and the nervous functions are in a state of perturbation or depression. These disordered states are the results of a slow inanition or starvation, not suspected, because food is taken to the full repletion of the stomach; yet still it is starvation, for the blood does not possess the elements for heat and nutrition adequate to the full energy and the consumption of life-action. These cases are not remediable by medicine; they can be relieved only by a restoration of the digestive functions, and a return to a wholesome and appropriate diet.

Cases of this character have augmented, in our towns and cities, and it is believed in the country, particularly amongst women, and in the industrious and labouring classes, in the last ten or fifteen

years, most rapidly. The neuroses, as *gastralgie*, different *visceralgias*, and other forms of *neuralgia*, are now quite as common amongst those classes, if not more so, than they were formerly amongst the luxurious and idle, to which they were almost exclusively confined.

A suspicion has arisen that this circumstance is to be attributed to the perversion of the use, as food, of tea and coffee, from their proper employment as nervous excitants and cordials, which are their appropriate properties. On inquiry, it is almost uniformly found, at least in the observations of many medical practitioners, that the greatest sufferers from these disordered states are the inconsiderate consumers of tea and coffee, who substitute them largely for food.

It would extend this inquiry too far to enforce the above views by relations of specific cases. A large number could be cited as strongly illustrating their correctness.

The practice of giving tea and coffee to children at their meals cannot be too strongly reprehended and discountenanced. In the first periods of life, the most nutritive food, rich in plastic elements, and capable of favouring the highest organization, is that which is required for growth and development. In the first fifteen years, nature is employed in constructing and perfecting the mechanism of life, fitting it for the conflicts, the exertions, the labours it must encounter and undergo in the struggles and difficulties of the great arena of the world, as well as with exterior malignant influences hostile to its existence, to which it is incessantly exposed. Without good materials there cannot be produced a good fabric.

Whatever tends to excite, to render irritable, or to develop unduly the cerebral structure and functions in children, is of necessity injurious. The bills of mortality show the fearful ravages in the early years of life from cerebral disease; and the foundation of most of the neurotic diseases and of ill-health in adult life dates from the abortive efforts of nature to build up substantial organs from the paucity and poverty of the building materials, or the abnormal direction imparted to nutritive action by over-excitement, in the commencement of development.

Tea and coffee being cerebral excitants cannot act otherwise than injuriously on children, in whom there exists no object for such artificial stimulation. Indirectly, they are mischievous by taking the place of food that contains all the elements and constituents of the fluids and solids of the organs and their products. They should be

abolished from the dietary of children in all well-regulated families, and by parents careful of their children's welfare.

The analysis of tea is not complete, like that of coffee, by M. Payen. As far as known, it contains no alimentary elements, and cannot be classed with food. It is a purely cerebral excitant.

Though the grain of coffee has, amongst its constituents, alimentary elements, yet in the common slovenly process of torrefaction, the calorifacient principles are destroyed; and the plastic are also more or less decomposed. But when more carefully performed, and these principles are not materially injured, still a small portion only can be dissolved in the infusion or decoction made in the ordinary mode.

The infusions of tea and coffee cannot, therefore, be used as food, and be made substitutes for nutritious aliment, without a serious detriment to the economy. They are cordial beverages, and as such are grateful and useful, especially to those engaged in mental pursuits, and who lead sedentary lives. They must, at the same time, be combined with substantial nutriment, or the blood becomes impoverished, and fails to contain the materials for organic structure, and evolution of nerve-force.

In proportion to the degree of physical exertions, are the wear and tear of the solids, and the expenditure of the forces. The elements to maintain these in their normal conditions must exist in the blood, and the blood obtains them from the aliment in which they exist, through the digestive apparatus. Tea and coffee, largely drunk at their meals by those engaged in active and laborious pursuits, by excluding a due quantity of substantial food, rich in the plastic and force-producing elements, are more injurious to these classes than to the sedentary.

The inevitable consequences of this practice must be to undermine the constitution, to impair the health, to break down the forces, to cause various nervous sufferings, and finally to produce disability for labour.

H.—14.

Letter from Professor WALTER R. JOHNSON, Corresponding Secretary of the National Institute, on the introduction of Water and Gas into cities.

WASHINGTON, March 31st, 1849.

Dr. JAMES WYNNE,
Chairman of Committee on Public Hygiene, of the American Medical Association.

DEAR SIR: In your note of yesterday, you ask to be informed, whether, in my opinion, "the supply of water and gas to cities, as well as their drainage, should be under the direction of, and conducted by, chartered companies, or the city authorities; and the reasons which have inclined me to prefer the mode which I deem most advisable."

In reply to this inquiry, I would state that, in my opinion, all these important municipal matters ought unquestionably to be controlled directly by the city authorities, and in no case be allowed to be left in the hands of chartered companies. The reasons for this opinion may be briefly stated as follows:—

1st. When managed by the municipal authorities, who are—in every case to which your inquiry relates—assumed to be elected by, and amenable to, the people of the town or city, the object kept in view by the authorities will be likely to be that which is the true legitimate aim of all municipal regulations, viz., the greatest good of the greatest number.

2d. Under any trading corporation, however constituted or limited in its chartered privileges, the selfish motives of trade and speculation will inevitably find their way into the management and operations of the works. This is not a mere matter of conjecture, but rests on the experience of many communities, and is a just inference from the experience of those cities which have tried both species of direction.

3d. It is also deducible from the analogies of other great interests

which are, by general consent, managed by the constituted authorities of the cities themselves, and not by corporate companies. Thus, the opening, maintaining, and cleansing of public highways, including the laying of pavements, and the construction of bridges, the maintaining of the public peace, the establishment and control of public market places, the support of public schools, the abatement of nuisances which would endanger public health, the establishment of public prisons, the management, in short, of every interest in which all, or a very great majority, of the citizens have a common concern, are cases directly in point. No one would think of intrusting these to corporate companies.

4th. To illustrate my views in the case of *water*, I may refer to the experience of the city of Boston, where, in former years, a company, deriving water from an inadequate source, undertook to supply the citizens with that indispensable material, and continued to receive compensation for such supply long after it had ceased to be able to meet the demands of the public, or the necessities of its customers, until, at length, the urgent wants of the public rose to a pitch which compelled the city to resort to means for obtaining that supply not subject to the operations of a trading corporation.

5th. I may refer to the corresponding experience of many towns in England, as exposed in the elaborate reports of the Royal British Commission on the health of towns, to prove that the community there, when supplied with water by corporate companies, especially where these companies enjoy monopolies, has, in almost every instance, been inordinately taxed for inadequate supplies.

6th. But not only the individuals who pay water-rents are liable to be imposed upon both in price and quantity, as well as the quality of the water furnished, but those supplies are particularly liable to be inadequate which are afforded by corporate companies to the city authorities for *public uses*, such as the washing of streets and the extinction of fires.

7th. On the contrary, we have the experience of those cities and towns of our own country, which have erected water-works under municipal direction, to prove the great utility of that species of management. Among these cities, Philadelphia has had the largest experience, having tried it about fifty years; New York about one-seventh of that time, and Boston for a few months only; and yet it would, I apprehend, be an exceedingly difficult task to persuade the inhabitants of either of these cities to abandon their present system,

and again accept such supplies of water as chartered companies would afford.

8th. To secure public health, the most abundant streams of water for cleansing streets and sewers, and for supplying private baths, ought to be at the command of every individual in a large and densely peopled city, and growing as rapidly as American cities now are. They cannot too early bethink themselves of this element of health, comfort, temperance, and purity. Public baths are no proper substitutes for the private bath-room in one's own dwelling; any more than the public pump is a substitute for the private hydrant, always ready to send forth its gushing stream at our own door.

9th. If, for the purpose of preventing imposition by a monopolizing company, two or more corporations be established for supplying the same district, they must, of necessity, cross the direction of each other's works, must come in collision, and excite at first a competition ruinous to both parties, and end with a combination between themselves to keep up prices, not less oppressive to the water renters than those of a monopoly, the purchasers of water eventually paying the costs of all their conflicts and litigation. All these results have been repeatedly produced in foreign countries, if not in our own.

10th. In managing water-works, gas-works, or sewerage, by corporate companies, not only will the pecuniary interests, but often the personal convenience, of the corporators be studied, to the neglect of the general safety and comfort of the citizens. When works which create nuisances, or any serious annoyance, are to be established in the heart of a large city, the plea of public utility will often be urged in favor of locating them on sites where the annoyance will be most seriously felt; on ground which, perhaps, the *company* find it convenient to purchase, but which the municipal authorities would not have felt authorized to occupy for such a purpose. The effluvia of gas-works are well known to create great annoyance to the residents in the immediate vicinity. Yet they are not unfrequently located in the very heart of a large city.

11th. The systems of under-ground drainage, from the days of the ancient Romans to our own times, have been justly regarded as objects of municipal regulation. The "*cloacæ*," or sewers, in Rome, were of such magnitude, that a rider on horseback, or a broadly loaded vehicle, or a galley with its oars, could pass along their channels. They were, in short, comparable to our modern canal or railway tunnels, and extended with many ramifications under all the

principal streets. Appropriate officers were specially charged with the superintendence and management of these important public works.

13th. Whatever may be thought of the supply of water and gas to cities, there cannot, it seems to me, be two opinions as to the propriety of placing the drainage entirely under the control of municipal authorities. It is one of those things which is perfectly identified with the whole physical character and social condition of the city, and no power short of that which controls all its other affairs ought to be allowed to regulate this. Now, if it be once admitted that under-ground drainage is necessary to a town, and that the public good requires it to be under the municipal rule, it follows, almost as a corollary, that every other operation requiring extensive under-ground operations, or the opening of fosses, ought, in like manner, to be subject to the same control. If one of these species of works belongs to the public, and another to individuals or companies, it is evident that one may be liable to great injury from the operations of another, and gas pipes, water pipes, and sewers will be crossing each other's paths. The prevailing inducement for extending the works of either kind into any given part of the city will be, not the accommodation of the public, but the obtaining of a maximum profit.

14th. Another reason for preferring *public* management of those works which afford supplies of such objects of prime necessity as light and water, is that the public management will always, in the long run, afford the supply at a cheaper rate than the private corporation. In the city of Philadelphia, where both water and gas-works are under municipal control, it is believed that water and gas are furnished to the consumer at lower rates than in any other city in the country. The works are so situated, and so constructed, as to create no serious annoyance in the streets or elsewhere. While the Philadelphia Gas Works were, during the first five years of their existence, under the control of stockholders, the cost of gas to the consumer was more than fifty per cent. higher, and the quality of the gas much lower than it is at this time, when they have changed owners, and are controlled even indirectly by the city government. A more direct management and still further reduction in price are loudly called for by the citizens. Even at the present price (\$2 25 per 1000 cubic feet), the works yield a large annual profit above the cost of making and disposing of the gas. In some other cities of the Union, it is true that corporate companies have succeeded in

imposing *two, three, and even more than four times* this rate of charge on the consumers of gas. Under public control, and with proper management, the authorities of our large towns might erect gas works that would speedily relieve their citizens from these monstrous impositions. Throughout the West and South-west, in particular, where coals of the best quality for making gas are abundant and cheap, as well as iron for the establishment of works, there is no sufficient reason why abundant and cheap light should not be matters of universal enjoyment.

I am, very respectfully,

Your obedient servant,

WALTER R. JOHNSON.

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324

H.—15.

Letter from Dr. THOMAS HARRIS, Chief of the Bureau of Medicine and Surgery, Navy Department, on the Use of Disinfectants in the Navy.

NAVY DEPARTMENT,
BUREAU OF MEDICINE AND SURGERY. }
May 16th, 1849.

SIR: I have to acknowledge your communication of the 28th ult., requesting information as to the result of inquiries and experiments, instituted by this Bureau, for the purpose of testing the value of various disinfectants, as applicable to ships and hospitals.

The only disinfectants which have received the special attention of this Department, are the nitrates of iron, zinc, and wood fibre, as prepared and applied by Mr. Robert Grant, and the "Disinfecting Fluid" of M. Le Doyen.

The Bureau of Medicine and Surgery assumed cognizance of Mr. Grant's operations on the 24th of June, 1848: prior to which date, he had been employed on board various vessels of the U. S. squadron, in the Gulf of Mexico, under the direction of the Bureau of Construction, Equipment, and Repairs. As the results there obtained had been imperfect and unsatisfactory, a board of medical officers, consisting of Surgeons Waters Smith, Thomas L. Smith, and Passed Assistant-Surgeon George Maulsby, were immediately detailed at the Navy Yard, New York, with orders to examine, and report upon, his whole theory and process of disinfection. The views of this board, as elicited by Mr. Grant's propositions and experiments, and communicated in the following extracts from their report, dated October 23d, 1848, will explain the course of the Bureau in declining, as it has done, all further connection with the operator.

Propositions of Mr. Grant.

"1. He considers the presence of hydrogen to be necessary to the propagation or spread of infectious diseases.

"2. The matter of contagion or infection, whether the result of animal or vegetable decomposition, or of whatever causes, unites

atom to atom with the hydrogen thus present, and is by it buoyed up and carried through the air; and produces disease by being inhaled into the lungs.

“3. In the natural (proximate) decomposition of vegetable fibre, hydrogen is evolved, in the first instance. After the hydrogen has ceased to be evolved, ultimate decomposition takes place; the oils, &c. of the wood take up oxygen from the atmosphere, from water, &c., and give off carbonic oxide gas. This gas, passing into the atmosphere, absorbs another portion of the oxygen therefrom, forming carbonic acid; and, while taking up this second equivalent, it acts chemically upon the miasmatic bubble floating in the air, and uniting with it, neutralizes, or destroys it.”

Preliminary Experiments, showing the Manufacture of Mr. Grant's Disinfecting Agents.

First.—Add nitro-muriatic acid (in four parts of water) to vegetable fibre; sawdust being the material used.

Formula.—The hydrogen of the wood is driven off, the acid uniting with the essential oils of the wood by a process of electric affinity.

Second Experiment.—Add nitrous acid to iron or zinc, forming nitrate of zinc or iron.

In this manufacture, a Woolf's apparatus is used to receive the nitrous fumes given off, that they may not be wasted. In conclusion, combine the wood and nitrate of iron or zinc.

This is the disinfecting material used.

The material thus prepared Mr. Grant proposes to scatter about in the holds of ships, and other foul or infected places; and in what has now been stated consists, as admitted by himself, his whole theory and practice of disinfection.

His theory of the mode in which infection is disseminated is entirely hypothetical, and has the farther disadvantage of being neither original nor new. Some half a century since, Dr. Garnett, of Manchester, suggested that hydrogen gas was probably the vehicle by which the morbific matter of contagion was carried about, and, upon that supposition, explained the alleged efficacy of the acid fumigations in destroying it.

The fumes disengaged from Mr. Grant's prepared sawdust are neither more nor less than those of nitrous acid and chlorine; that is to say, precisely what has been proposed and extensively used by Carmichael, Smyth, Moreau, and others, at least as far back as 1780.

The Board consider his process to be an unscientific mode of arriving at well-known chemical results; and that the active agents

in his preparation are those which have been in use, long since, in our own and foreign navies, and which have been very generally laid aside, for reasons of some cogency.

As a deodorizing agent for "apartments crowded with sick, decomposing animal and vegetable substances, vaults, sewers, and other receptacles of noxious matters," they believe it to be inferior to the chloride of zinc of Sir William Burnett, or the nitrate of lead of Le Doyen; these last have, at least, the advantage of not substituting one bad smell for another.

Entertaining these views, they cannot recommend its "general adoption into the naval service."

The "Disinfecting Fluid," or solution of nitrate of lead, of Le Doyen, was first submitted for experiment at naval hospitals in November, 1848, by order of this Bureau. The cases at these institutions have thus far afforded but few opportunities for its application; but in such as have occurred, the results have been favourable with regard to the deodorizing power of this material.

Surgeon William F. Patton, in charge of the hospital near Norfolk, Va., informs me that, in two instances of foul ulcers, in which the fluid had been employed, the odour was completely destroyed; and its effect was similar in the apartments occupied by the insane.

Surgeon R. J. Dodd, at the Hospital of the Naval Asylum, Philadelphia, says, "In several cases, it has been applied with benefit to ill-conditioned ulcers. Its efficacy in removing offensive odours is complete."

I subjoin, also, the opinion of Surgeon Waters Smith, as given in the following letter:—

U. S. NAVAL HOSPITAL,
New York, January 3d, 1849.

SIR: I have to acknowledge the receipt of your letter of the 15th ult., by the hands of Dr. Boyd, of Brooklyn.

The small quantity of "Le Doyen's Fluid," furnished by order of the Bureau, is exhausted, and it is my intention to ask for a further supply in my requisition for the present quarter.

Our opportunities for testing its properties, in this establishment, thus far, have not been great; but, such as they have been, they tend to confirm the results of the more extensive experiments made in England by Dr. Leeson and others. For instance, we had, at one time, nine small-pox patients secluded in two rooms of moderate dimensions, in which they were kept until the disease had run its course. A few ounces of the fluid, sprinkled occasionally in each

apartment, kept them perfectly sweet, entirely destroying the peculiar and offensive odour connected with certain stages of that disease. We have had similar proof of its power in correcting the fetor of water-closets, night vessels, &c.

Even with this slight experience, one may venture to pronounce it a valuable agent in the hands of the hospital surgeon; and that it must prove equally so on ship-board may be inferred from its chemical composition, viewed in connection with the gases most frequently and copiously generated in the holds of vessels. One marked advantage which it possesses over the rest of the class of (what is loosely called) "disinfectants," is that it is in itself inodorous.

It is my purpose, whenever occasion offers, to try its efficacy in correcting certain morbid discharges, and as a local application in various surgical diseases.

I am, with much respect, your obedient servant,
WATERS SMITH,
Surgeon.

DR. THOMAS HARRIS, Chief of the Bureau of Medicine and Surgery, Washington.

With a view to extend these investigations, and to test the operation of this material in sea-going ships, a special circular was addressed, on the 2d inst., to surgeons of navy yards, authorizing and advising its use at naval stations, and on board all classes of U. S. vessels. As a report of each medical officer's experience will be required, it may be in my power at a future time to communicate more conclusive information.

In closing this statement, however, I would observe that, while desirous of affording every facility for averting and controlling disease, it has never been either the policy or wish of this Bureau to give to such agents any other than an accessory importance. By a rigid observance of that internal police which the principles of naval hygiene recognize as indispensable to the preservation of health on ship-board, it is believed that the necessity for recourse to "disinfectants" would be almost entirely, if not wholly, averted.

I am, with much respect, your obedient servant,
THOMAS HARRIS.

JAMES WYNNE, M. D., Chairman of Committee on Public Hygiene, American Medical Association, Baltimore, Md.



